VETERINARY MEDICINE

Registered in U. S. Patent Office

VOL. XLIII OCTOBER, 1948 No. 10

Published Monthly by the

VETERINARY MAGAZINE CORPORATION

7632 S. CRANDON AVE., CHICAGO 49, ILL., U.S.A.

$5.00 a year; per copy 50 cents

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Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879. Entered as second-class matter under the title of American Journal of Veterinary Medicine July 19, 1910, at Chicago, Ill., under the Act of March 3, 1879.

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The Ebers papyrus contains 811 prescriptions and mentions more than 700 drugs of mineral, vegetable, or animal origin.

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From the Aztecs and the Incas, medicine obtained: coca, Cinchona, jalap, Gaultheria, Sanguinaria, Lobelia, Hydrastis, Podophyllum and many less used or now discarded drugs.

—♦—

Catharsis formerly meant purification. At the time, illness was regarded as divine punishment for pollution through sin.

—♦—

The Chinese employed goose grease for innunctions many centuries, (or maybe it was millenia) ago. Now research has placed *adeps anserinus* at the top of the list of fals with penetrating power. Thus does science at long last approve the conclusions of empiricism.

—♦—

Of 72 Chinese Buddhas, 29 were gods of medicine. But with honor went responsibility; of 150 Chinese hells one was reserved for physicians exclusively and another was reserved for pharmacists. Possibly they had Veterinary departments in their stores!

—♦—

When official regulations provide that bacterins, vaccines, sera etc. shall be hermetically sealed they but pass along the directions and even the name of the ancient Egyptian alchemist Hermes (not the Greek Hermes or Mercury). Hermes stipulated that the vessels containing the results of his alchemy must be kept tightly sealed.

If whey is pasteurized and does not contain more than four ounces of salt per 100 pounds, it may be used, if fresh, instead of water in mink rations.

—♦—

J. W. Ward, University of Mississippi, in a necropsy of 17 wild gray fox carcasses recovered *Taenia pisiformis* from 15 or 88% of them; the number of scoleces varying from one to 54 and averaging 13 per fox. Two foxes were infected with *Toxocara canis* and one with *Uncinaria stenocephala.*

—♦—

At the Wisconsin experiment station it was observed that mink kits die when fed a ration containing more than 13.59% of protein on a dry weight basis. The principal symptom is partial paraplegia; the lesions, fat in the groin, intestine and kidneys, splenauxe and often gastric ulcers. Prevention and treatment depend upon correction of the ration, according to these investigators.

—♦—

It must be realized that foxes die of conditions other than those due to parasites and the Carre virus. The impression that parasites and distempers are about the only killers is readily obtained because these conditions cause greater losses than any others and are the most written and talked about. The early fox rancher quickly learned what he could and could not do in the husbandry of his animals. This information has been recorded by the Canadian industry, but little information has been published relative to the causes of death.

85th Annual Meeting of the A.V.M.A.

THE meeting of the A.V.M.A. in San Francisco, August 16 to 19, 1948, developed a number of surprises, the greatest of these being the large attendance—over 2000 registrations.

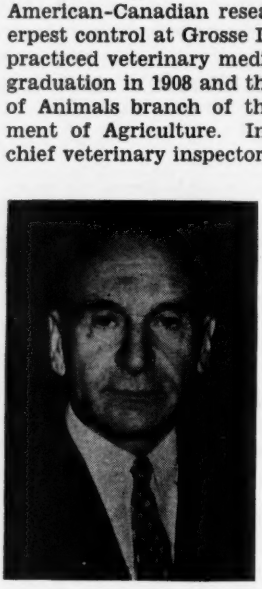
Previous meetings on the West Coast indicated a small attendance, thus the 1910 meeting at the same hotel was attended by 96 members and three times as many visitors, the 1915 meeting in Oakland by 125 members and 200 visitors and the Los Angeles meeting by 625 all told. An attendance of 1200 was expected at this meeting and the increase of two-thirds in the expected number somewhat overwhelmed the facilities at certain of the social features—banquet, women's breakfast and sight-seeing trips. A cook's strike at the banquet added to the difficulties at that function. However, if the S. F. banquet convinces the top brass that A.V.M.A. meetings have outgrown the traditional annual banquet it will have been the most useful function of its kind in years. Since our banquets have exceeded the capacity of all but a few of the largest hotels in a few cities they have been mostly an annoyance to many who could not obtain tickets and to an equal number seated at tables in hallways, aisles, galleries and even adjoining rooms. Abandonment of the general banquet and more emphasis on alumni dinners would improve social features of our meetings and make available a wider selection of cities and hotels in which to hold meetings.

The delightfully cool weather that prevailed in San Francisco during the meeting contributed greatly to comfort and enjoyment of those attending and probably was a factor in bringing about what was probably the best attendance at general and section meetings in the history of the Association.

Awards

Three awards are presented annually at A.V.M.A. meetings—The 12th International Veterinary Congress Award, The Borden Award and the A.V.M.A. Humane Act Award. Recipients of these honors at the San Francisco meeting were:

12th International Veterinary Congress Award.—A. E. Cameron, ONT'08, Ottawa, Ont., "for his long and distinguished service to veterinary medicine and to mankind and for his zeal to improve the profession." The citation also commended Doctor Cameron for his service to the livestock industry of Canada, and for his work in three wars. He served in the Boer War in South Africa in 1899-1900; in World War I as veterinary officer of the Sixth Canadian Infantry Brigade in France, Belgium and Germany and in World War II he was in charge of the Canadian group in the American-Canadian research project on rinderpest control at Grosse Isle. Doctor Cameron practiced veterinary medicine for a time after graduation in 1908 and then joined the Health of Animals branch of the Dominion Department of Agriculture. In 1925 he was made chief veterinary inspector, and later appointed



A. E. Cameron

Veterinary Director General of Canada. He retired from active service in 1943.

Borden Award.—A. F. Schalk, OSU'08, Columbus, Ohio, for "outstanding dairy cattle disease research that has brought great benefits to mankind." Doctor Schalk, while serving as a veterinary professor in North Dakota

A. F. Schalk

State College, originated a highly successful surgical technic for making a fenestra in the bovine rumen, so that the arrival of the feed in the organ and how it was handled there may be watched. He made his technic and discoveries available to other scientists, and

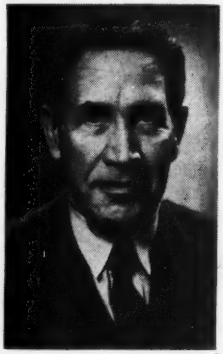
had a movie made recording the digestive processes seen through the gastric fistula.

The citation pointed out that, as the result of Doctor Schalk's research, scientists have been enabled to solve many perplexing problems in bovine nutrition and disease, and to develop superior feeding methods that have helped America to become a world leader in meat and milk production.

The award also gave recognition to Doctor Schalk's part in the discovery that consuming damaged sweet clover hay produces a hemorrhagic, often fatal, cattle disease and that blood transfusions bring about a spectacular recovery. A chemical in the damaged hay, dicoumarin, which causes the bleeding, is now being used widely in human and animal surgery to prevent post operative fatal blood clots.

The scroll containing the citation was accompanied by a check for $1,000 contributed by the Borden Company.

A.V.M.A. Humane Act Award.—Richard Swank, 15, Mentor, Ohio, for saving the life of an abandoned puppy. Richard received a $100, U.S. savings bond in addition to A.V.M.A. award certificate.



L. M. HURT, President

Leslie M. Hurt, was graduated from the Iowa State College in 1904 with the degree of D.V.M. After a short period in the B.A.I. he returned to teach physiology in the Iowa school three years, and also received a B.Sc. in agriculture. For the next five years he was Professor of Veterinary Science and Experiment Station Veterinarian at the Michigan State College. In 1912 he accepted the position of City Veterinarian in Pasadena, California, and shortly thereafter was appointed Livestock Inspector for Los Angeles County.

Officers 1948-1949

Officers elected for the ensuing year were:

C. P. Zepp, Sr., CORN'19, New York City, president elect

Gen. James A. McCallam, V.C., U.S.A., UP'17, Washington D.C., first vice-president

R. C. Dunn, OSU'11, College Station, Texas, second vice-president

R. Sugg, AP'17, Auburn, Alabama, third vice-president

E. F. Johnston, ONT'22, Carp, Ontario, fourth vice-president

L. J. Goss, OSU'34, New York City, fifth vice-president

W. A. Young, ISC'19, Chicago, Illinois, (re-elected) treasurer

Leslie M. Hurt, ISC'04, president-elect, was installed as president for the 1948-1949 association year.

Women's Auxiliary of A.V.M.A.

Mrs. Anthony E. Bott, Belleville, Ill., president

Mrs. Victor H. Miller, Charleston, W. Va., 1st vice president

Mrs. Dennis Coughlin, Knoxville, Tenn., 2nd vice president

Mrs. H. W. Ayers, Oklahoma City, Okla., 3rd vice president

Mrs. H. S. MacDonald, Toronto, Ont., Canada, 4th vice president

Mrs. C. L. Miller, River Forest, Ill., secretary-treasurer

Women's Veterinary Association

Patricia O'Connor, CORN'39, Staten Island Zoo, New York City, president

Capt. Doreen Hatfield, V.C., U.S.A., WASH'44, Baltimore, Maryland, secretary

Prof. Lois Calhoun, ISC'40, Michigan State College, East Lansing, Michigan, treasurer

Josephine M. Deubler, UP'38, University of Pennsylvania, Philadelphia, eastern vice-president

June H. Platt, MSC'46, East Lansing, Michigan, mid-western vice-president

Hope M. Campbell, MSC'42, Dallas, Texas, southern vice-president

Mary K. Dunlap, MSC'33, Berkeley, California, Editor *WVA Bulletin*

Amendments to the Constitution, By-Laws and Code of Ethics

Amendments were adopted to provide:

(1) that membership in the association shall depend upon membership in a constituent association for veterinarians living in the United States and Canada, (2) the annual dues shall be raised from $7.00 to $10.00, (3) that the tenure of office of members of the House of Representatives shall be increased from two to four years, (4) that the president elect, instead of the president, shall preside at meetings of the House of Representatives, (5) that no member shall serve a lay organization which encourages or promotes veterinary quackery, (6) that ethical pharmacists shall be recognized by members, but those engaged in veterinary quackery shall not be recognized as professional men and (7) that the name of the section on Sanitary Science and Food Hygiene be changed to the section on Public Health.

Honor Roll

Having been members for 50 years, the names of C. E. Cotton, J. W. Griffith, John R. Mohler, E. M. Nighbert, J. D. Sprague and R. J. Stancliff were added to the Honor Roll, which now numbers 14.

Finances

The income of the Association during the year was $168,721. Chiefly because of the increased cost of printing, the expenses were $21,000 greater. It is estimated that a reduction in the size of the official Journal and the $3.00 increase in the annual dues will enable

C. P. ZEPP, SR.

the Association to operate within its income during the ensuing year.

The provision by which the Association will pay one-half of the railroad and Pullman fare of one delegate from each constituent association was in effect at this meeting for the first time. Nevertheless a number of constituent associations were not represented.

Eve

No account of the San Francisco meeting could be quite complete without mention of the activities of EVE (Dr. E. V. Edmonds), who apparently spent his nights drawing large caricatures of friends at the meeting. When presented to the caricatured the next morning they were responsible for the biggest laughs of the day, and were later taken home as the most treasured mementos of the convention.

Those who are fortunate enough to receive personal letters from Doctor Edmonds are always delighted by a pen and ink drawing on the envelope which is a key to its contents. EVE, in real life is a quiet, sedate, almost skinny veterinarian in the employ of the California Department of Agriculture, but is always depicted in his art world as a very fat, hilarious, somewhat boisterous porker. In our cartoon it is not quite clear why EVE is up a tree and out of sight. In most of his cartoons he is pretty much the center of things. Possibly it is for poking fun at animals for acting like *Homo sapiens*, or again maybe it is the other way around. In any case, those who attended the convention need no explanations to recognize the scenes depicted.

By way of further identification of the cartoonist, it may be mentioned that the versatile Doctor Edmonds is a frequent contributor to veterinary literature; his latest publication being the extremely important discussion of the treatment of swine enteritis, which appeared in May, 1947 issue of Veterinary Medicine, pages 170 to 173. Another article from his pen on the same subject will appear next month.

August Meetings to Continue

Members of the House of Representatives were polled as to their choice of months in which to hold annual meetings. August won by a narrow margin. However, the meeting in Detroit next year will be held in July (11th-14th) because the 14th International Veterinary Congress is scheduled in August (9th-14th).

The 1950 Meeting Place

Four cities—San Antonio, Houston and Dallas, Texas and Miami, Florida presented invitations to the association for the 87th annual meeting in 1950. The facilities afforded by each city will be surveyed before a selection is made.

San Francisco Convention Activities

Cassius Way Dies Following Kick by a Horse

Cassius Way, 67, was born in Connecticut and graduated from the Connecticut Agricultural College (B. Agr.) in 1899, from Cornell University (A.B.) in 1906 and from the New York State Veterinary College (D.V.M.) in 1907. He died of a heart attack at his home in White Plains, N. Y. Aug. 6, 1948. He is survived by his widow.

Doctor Way made a call to a race track on Long Island on the day of his death. While treating a horse he was kicked by it. He didn't regard his injury as serious and completed the treatment and then drove home. Mentioning that he was tired, he lay down and when next seen, a short time later, was dead. He had been in poor health for several years.

Immediately following graduation, Doctor Way practiced for a year in New York City, then followed a 10-year period in the employ of the Borden Company in the capacity of milk sanitarian. Since 1919 he had practiced in New York City. He had an extensive practice among Thorough breeding farms and among racing stables over a wide section of the East and South.

Doctor Way was president of the A.V.M.A. in 1939-1940 and a member of many professional and other organizations.

Hippocrates taught that inclusion of certain food in the diet would prevent night blindness. He also recommended liver to cure night blindness; thus antedating McCollum by some 2300 years ago.

The Entering Wedge

Where sufficient competent veterinarians are available and willing to do the work, we believe they should carry out the (Brucellosis testing and vaccinating) program. They have had years of training and experience. They have professional reputation to maintain. They can give information and counsel as they go about their work. They give a certain degree of assurance that the work is being carried out carefully and on a high plane of ethics. Disease control and eradication is their profession—their life's work.

Where adequate competent veterinary personnel is not available, however, the best interests of the livestock industry and the public will be served by using well trained laymen to further the brucellosis control program as rapidly as possible. Every day lost in this effort means that the disease gains with our delay. We have lost much valuable time during the war years. The cost of control and eradication is much higher today with an incidence of about 5% than it would have been just before the war when the incidence was about half what it is now.

—Hoard's Dairyman

There has been a decided decrease in the number of brucellosos free accredited herds in Illinois in the past six years. In 1942 there were 526 such herds; there are 104 now.

The passing of the "oldtime family doctor" and the succession of the medical specialist, is often deplored as a misfortune of recent date. Herodotus, "the father of history," wrote that in his time (5th century B.C.) medicine was highly specialized. "Each physician is a physician of but one disease and no more."

Doctor Grogan Succumbs to Heart Attack

Dr. Glen Dee Grogan, 66, Peoria, Ill., died at St. Francis Hospital, Peoria, Aug. 6, 1948. He had been confined to the hospital two weeks by a heart ailment.

Doctor Grogan was graduated from the Indiana Veterinary College in 1907, and had practiced at Mendota, Illinois (1909-1929), and at Aurora, Illinois, subsequently, until a few years ago when he discontinued practice to become associated with the Vitamineral Products Company of Peoria, and devoted all his time to nutritional investigation and application among the veterinarians of the Middle West.

While in small animal practice at Aurora, Doctor Grogan devised the popular type kennel for veterinary hospitals which is named for him. He was a member of many civic, religious, fraternal and professional organizations.

State-Wide Milk Pasteurization Law in Michigan

Effective July 1, 1948, a new Michigan law requires the pasteurization of all milk sold in the retail trade and also of milk, cream, and other dairy products used in the manufacture of butter, cottage cheese, and cheese. An old law provides the same safe guards for dairy products used in the manufacture of ice cream.

Milk and dairy products sold at the farm where they are produced, or used on the farm where they are produced are exempted from the provisions of the new law, but the state board of health is conducting a campaign to encourage the home pasteurization of such milk.

Beyond the Alchemists' Dreams

New discoveries announced at the recent annual meeting of the American Chemical Society in Washington D. C. read like delirious imaginations.

Some of the new discoveries having particular application to veterinary medicine were:

Hypospray Jet Injector

An instrument, essentially a hypodermic syringe that requires no needle was shown. It ejects a stream of liquid of smaller diameter than the pores of the skin and which, therefore, penetrates the skin painlessly and without causing a wound.

Extremely Potent Local Anesthetic

SKF 538-A for short, 1-(B-dimethylaminoethoxy)-4-bulylisoquinoline was shown, on rabbits, to be vastly more potent than cocaine in producing local anesthesia.

Synthetic Coagulants

A group of sulfonated proteins were shown to have the power to arrest hemorrhage promptly in dogs. These compounds are far from ready for marketing for general use.

Fungicide of Great Effectiveness

A potent fungus killer, echridine, was exhibited. It is said to be the most effective of fungicides not only upon the skin of man and animals, but for use on agricultural crops also.

Vitamin A_2

The discovery of a fat soluble vitamin A in the livers of freshwater fish was announced. It is but one-half as potent as the vitamin A obtained from the livers of cod, shark and other salt-water fish.

Synthetic Vitamin D

The preparation of a synthetic vitamin D was announced. This vitamin can be produced at a cost low enough for use as a supplement in poultry feed.

Substitute for Animal Protein

As a prediction, not a discovery, Dr. A. A. Albanese, New York University, College of Medicine, stated his belief that cheap vegetable proteins, such as those of soybeans, can be made as nutritious as meat or eggs by enriching them with synthetic amino acids. He did not discuss the palatability of the artificial animal proteins.

Chlordane—also known as 1068 because of its chemical formula consisting of 10 atoms of carbon, six of hydrogen, and eight of chlorine—is continuing to receive favorable mention as an efficient insecticide. It is reported to be less toxic to the host than other insecticides, and more varieties of ectoparasites are controlled by its use. It has no objectionable odor, and it volatilizes slowly thus giving longer protection.

Army Veterinary Officers Retired

Colonel Raymond T. Seymour, V.C., KCVC-'15, 58, upon his own application was placed on the Army retired list effective 31 July 1948. He is a graduate of the Army Veterinary School: Medical Field Service School, and attended a special course of instruction in the science of breeding and clinics at the University of Kentucky.

Colonel Seymour was commissioned a 2d lieutenant in the Veterinary Reserve Corps September 6, 1917, entered on active duty June 17, 1918, and was promoted through the grades, obtaining his colonelcy on June 17, 1944.

Colonel Joseph H. Dornblaser, V.C. MCK'17, upon his own application is placed on the retired list effective 31 July 1948.

He was commissioned a 2d lieutenant in the Veterinary Reserve Corps on August 6, 1917, entering on active duty September 16, 1917. He was promoted through the grades, attaining the rank of Colonel September 16, 1943. His station at time of retirement was the South Central Remount area, Fort Reno, Oklahoma.

Phi Zeta Chapter Inaugurated at A. P. I.

The national honorary Society of Phi Zeta has granted a charter to the School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Alabama. The local group at Auburn, The Epsilon chapter, was installed August 13, 1948 at a dinner meeting at the Clement Hotel, Opelika, Ala. by Dr. M. W. Allam, national president, from The University of Pennsylvania, who was assisted by Dr. T. C. Fitzgerald and Dr. N. D. Crandall of Auburn who became members at their respective alma maters.

The objects of the Society of Phi Zeta are to recognize and promote scholarshpi and research in matters pertaining to the welfare and diseases of animals. Chapters of this Society may be formed at any accredited veterinary college or at any other institution of learning or of animal research. It is the oldest organization of its kind, the mother chapter being formed April 26, 1925 and nationalized in 1927 at Cornell University, Ithaca, New York.

The charter members of Epsilon chapter at Auburn feel highly complimented and grateful for the recognition shown them by election to the Society of Phi Zeta. This was only made possible through unanimous approval of the existing chapters throughout the United States.

The first officers of the Epsilon chapter are:

president, Dean R. S. Sugg; vice president, Dr. J. E. Greene; Secretary, Dr. A. A. Leibold. The executive committee, Drs. N. D. Crandall, T. C. Fitzgerald, W. J. Gibbons, E. S. Winters and Mr. T. W. Oliver.

* * * *

Dr. Danks Appointed to Veterinary College Staff

Formerly professor of veterinary surgery, New York State Veterinary College, Arthur Gordon Danks has been oppointed professor

DR. A. G. DANKS

and head of the department of veterinary clinical medicine, University of Illinois College of Veterinary Medicine.

With his varied educational background, Doctor Danks becomes one more nationally known veterinarian to join the Illinois faculty. Born in New Jersey, he received his bachelor of science degree at Pennsylvania State College, at Cornell University.

Teaching experience was gained at Kansas State College, where he was assistant professor, and at Cornell University, where he taught operative, general, and clinical surgery from 1936 until his appointment to the U. of I. faculty. Besides being editor of the Cornell Veterinarian for several years, Doctor Danks has made many contributions to literature, the best known of which is the recent revision of "Williams' Surgical Operations." He has been a frequent contributor to the programs of state and other veterinary association meetings in the eastern and midwestern states.

During the past year, Doctor Danks was consultant in the planning of the veterinary curriculum for the college. He also was helpful in formulating the plans for the clinical and hospital units of the proposed College of Veterinary Medicine building. He is a member of the American Veterinary Medical Association for the Advancement of Science, Sigma Xi, and Phi Kappa Phi.

Purification of Rabies Vaccine*

Rabies vaccine made from the brain and cord of rabbits is a mixture of inert and of antibody-producing fractions. The effect of removal of an inert portion upon the immunizing value of the residual has been studied, and the result warrants a brief report.

Fats and lipoids, extracted from desiccated vaccine (*J. Inf. Dis.*, 1912, 10, 369-377; 1913, 13, 155-164) with various solvents and injected into mice, do not confer protection or provoke evidence of toxic response when given subdurally or intraperitoneally. Lipoids may be removed with ether, chloroform, acetone, or xylol, but in the process much or all of the living virus may be killed. But when the extraction is made at a low temperature (-65°C) with a petroleum ether of low boiling point (20°-40°C), the virus is not destroyed nor is its antigenic value impaired. Tests of the residue made one year after the extraction show the amount of living virus to be as large as in an untreated sample of the same lot.

Immunity is effectively established earlier with this fraction than with the whole. A single intraperitoneal injection has resulted in the protection of Swiss mice against a challenge of 1,000,000 times the LD for unprotected mice.—D. L. HARRIS, *Pasteur Clinic, St. Louis Health Department, Mo.*

M. Lois Calhoun, M.S., D.V.M., Ph.D., formerly Associate Professor in the Department of Anatomy of Michigan State College, was promoted to Professor of Anatomy and Head of the Department, effective July 1, 1948, succeeding Dr. Russell A. Runnels, whose transfer to the Department of Animal Pathology in the same instituion was announced last month (Vet.Med. August, 1948, page 310). Doctor Calhoun received her degrees, B.S., 1924; M.S., 1931; D.V.M., 1939, and Ph.D., 1945 from Iowa State College.

Science 8:2798, pp. 145-166, August, 1948.

Status of Foot-and-Mouth Disease Vaccination

Foot-and-mouth disease is one of the ancient plagues of cattle; second only to rinderpest in importance to the cattle industry. It shares with rinderpest the distinction of having been the subject of several international conferences devoted exclusively to consideration of a single disease of animals. No disease of animals has been the object of more research; or more productive research. Much of the available knowledge of viruses and of all virus diseases was developed in the study of this disease.

Three especially brilliant research achievements in the study of foot-and-mouth disease are: (1) the discovery of a filterable virus as a cause of disease, (2) the discovery of antigenically different strains of a virus and (3) the development of the Waldmann vaccine, which has made possible the eradication of foot-and-mouth disease from practically any area having a good veterinary service and public support of the project.

Some diseases of animals can be eradicated by the slaughter of infected animals and practicable sanitary measures. Tuberculosis is an example; glanders is another; dourine a third. All spread slowly. Only under exceptional circumstances can the plagues that spread rapidly be eradicated without interposing immune animals in the path of extension. Rinderpest, foot-and-mouth disease, hog cholera and possibly anthrax are plagues that have resisted (except under special circumstances) every effort at control or eradication until serviceable vaccines were produced.

The history of rinderpest in the Philippines is an enlightening example of the difficulty in eradicating a disease of animals that spreads rapidly. It resisted every effort the veterinary service could bring to bear upon it, even including an extremely expensive use of hyperimmune serum, until a serviceable tissue vaccine was developed. Then it was eradicated by the same personnel that had been unsuccessful in lowering its incidence without vaccine.

The experience with rinderpest in South Africa was much the same except the task was made far more difficult by reason of the large land mass and the fact that many wild game animals were infected. A further difference was the use of a goat blood vaccine instead of the more expensive, and more difficult to produce, tissue vaccine.

The history of attempts to eradicate foot-and-mouth disease is not less interesting. Hundreds of outbreaks have been eradicated in Britain by the slaughter of infected and exposed animals. The success of this method has been due to exceptional circumstances, (1) no contiguous infected land masses, (2) a small area, and (3) an organization that, in the great majority of cases discovered the disease while still confined to the original premises on which the outbreak occurred, and acted so quickly in stopping traffic and in disposal of infected and exposed animals as to confine the disease, in most instances, to the premises where originally found.

Some eight or ten outbreaks of foot-and-mouth disease have been eradicated in the United States by slaughter of all exposed and infected animals. Again, special circumstances have contributed much to the success of the plan. (1) There have been no contiguous infected land areas, (2) except in the 1914-1915 outbreak, the invasions have been discovered so early and the defensive forces mobilized so quickly and thrown into the fight in such numbers that the slaughter method had little test.

Because of the great extent of territory involved, the eradication of the 1914-1915 outbreak in this country was an outstanding sanitary achievement that deserves to rank with the eradication of dourine, glanders and bovine tuberculosis. Some things in connection with it are not understood to this day. The easiest way to close the discussions of it is to say, "One swallow does not make a summer."

In Mexico, where conditions were radically different from those in the United States, the slaughter method not only in no instance approached eradication, but at no time halted the extension of the disease, notwithstanding sincere, energetic effort and lavish expenditure. The quarantine no doubt slowed the spread of the infection but it was not only freely admitted, but loudly proclaimed, all the way from the USDA in Washington to the sheep herder on the New Mexico desert, that if the disease was not eradicated from Mexico it could not be kept out of the United States by any means known to the proclaimers. This statement was made notwithstanding the well-known experience of Switzerland in keeping out the disease chiefly by means of vaccination although completely surrounded by infected territory. Plainly the outbreak of foot-and-mouth disease in Mexico caught our official livestock sanitary services and our livestock industry completely indifferent to what had been learned about the disease in the past 20 years and determined to make no concessions to research and progress within that period. The result of this reactionary attitude was the expenditure of 35 million dollars

in a futile attempt at eradication by slaughter alone, and the loss of months of time, the cost of which can never be computed.

Switzerland has achieved conspicuous success in handling foot-and-mouth disease. Lying in the pathway of the east-west waves of the disease, that periodically engulfed Europe for hundreds of years, its experience with the plague has known no limit. When an efficient veterinary service was established Switzerland was one of three countries (The U. S. and Britain were the others) in the whole world, that were successful in stamping out the plague by radical slaughter methods. This was possible because of the mountain barriers at her borders. Since the development of the Waldmann vaccine Switzerland has been able to relax the restrictions on importation of cattle and to eradicate such outbreaks as have occurred at little cost by slaughtering only affected animals.

Prof. Dr. G. Fluckiger, chief of the federal veterinary service of Switzerland, in a comprehensive article[1] explains in detail the application of quarantine slaughter and vaccination which constitute modern handling of the disease. The following are excerpts from Professor Fluckiger's article:

1. A percentage (Waldmann demonstrated 6%) of the animals that recover from foot-and-mouth disease become carriers of the virus for as long as 30 months and probably permanently. These carriers are responsible for new outbreaks of the disease. In any successful control measures *all animals that contract the disease must be slaughtered.*

2. Every method which was successfully applied to the prophylaxis and therapy of other infectious diseases was tried against foot-and-mouth disease without success.

3. In the 1920's, Vallee and his collaborators in France developed a vaccine inactivated by formalin. It was successful on guinea pigs but sometimes caused the disease in cattle. Later S. Schmidt and his collaborators in Denmark prepared a vaccine by absorbing the virus with aluminum hydroxide. This vaccine, also, successfully immunized guinea pigs but was not dependable in cattle.

4. Waldmann and his collaborators in Germany developed his vaccine (1938) by a combination of the methods of Vallee and Schmidt; *i.e.*, he absorbed the virus on aluminum hydroxide and treated it with formalin and heat till it had lost its infectiveness, while its immunizing capacity was fully retained.

5. The Conference of the International Epizootic Institute (Paris) in May, 1939, adopted, unanimously, a resolution declaring that, "the conditions for the prevention of foot-and-mouth disease *have been fundamentally changed by the application of active immunization to this disease*". Great progress in combatting foot-and-mouth disease was thereby achieved. [It will not be forgotten that eight years after this recognition of vaccine by the highest authority in the world on epizootics and after this "great progress was achieved" we attempted eradication of the outbreak in Mexico by the identical methods employed in 1902 and 1908, and inferred our estimation of the research of Vallée, Carré, Schmidt, Waldmann, *et al.*, by their vaccine with "alleged cures".]

6. Since the introduction of the Vallee-Schmidt-Waldmann vaccine in 1938, it "has factually proved *efficient everywhere with millions of animals while also being innocuous*".

7. "The advantage of the vaccine is evident primarily in those countries where the 'stamping out' method prevails. General vaccination of the exposed animals in the surrounding vicinity of the slaughtered stock *will prevent the spread of the disease.* The good effect of slaughtering method *has been clearly improved upon by vaccination* . . . . By applying vaccination at the same time as the slaughtering of the primarily infected stock, the disease can be stamped out mostly within a short period. Such a system is also financially much cheaper than the 'stamping out' method alone, as the quickly achieved immunization protects animals that would otherwise have also to be slaughtered."

8. "All animals that have been carefully treated by prophylactic vaccination and have not already suffered from foot-and-mouth disease are quite innocuous and do not spread the disease.

9. An international conference on foot-and-mouth disease, under the auspices of the International Office of Epizootics, was held in Berne, Switzerland September 30 to October 3, 1947. The deliberation had to do mainly with the technic of preparing the Waldmann vaccine. The conference was attended by representatives of 11 nations. In addition to agreeing upon the method of preparing the vaccine the conference adopted the following resolution:

" . . . the vaccine prepared with aluminum hydroxide, according to the method of Schmidt-Waldmann, if properly employed, is effective and absolutely safe. It is especially noted, *it has never been observed that immunized animals have developed the disease following vaccination, nor do they eliminate virus.*"

1 Fluckiger, G. Combatting foot-and-mouth disease by modern scientific methods. *Vet. J.* (London). 104:5, pp. 135-145. 1948.

Further Studies on Propagation of Hog Cholera Virus in Vitro Including Electron Micrographs

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THE modification of Simms-Sanders[1] serum ultrafiltrate method of tissue culture which was previously reported[2] successful for the propagation of hog cholera virus has been used in a new series carried, to date, through the 89th generation. The earlier generations of this series are extremely virulent for pigs, producing severe symptoms in a dilution of 1×10^{-8} and a rise in temperature on the ninth day in a 1×10^{-10} dilution. However, continuously from the 52nd generation, a change in virulence has occurred. Pigs inoculated with the various culture passages have usually responded with rise in temperature and frequently with other symptoms observed in hog cholera, but none have reacted severely except in a few cases which were due to concurrent infections or some condition other than cholera. In all instances, pigs which resisted the inoculation of culture were subsequently found immune to a challenge dose of blood virus. Propagation of hog cholera virus in an artificial medium has, therefore, been amply demonstrated by the effects of this cultured virus on susceptible animals.

Further demonstration then, should be extended to the appearance of the virus itself. The virus is grown in a medium composed of pig serum ultrafiltrate, bone-marrow, and modified Simms-Sanders' physiological solutions; after suitable incubation, the fluid culture is drawn off leaving behind the sediment of bone-marrow cells. This culture suspension is relatively free from extraneous material and, for this reason, appeared to be amenable to facile purification for study under the electron microscope.

Partial Purification by Ultracentrifugation

Accordingly, 15ml of pooled passage cultures 70 and 71, and an unseeded medium for control, were freed of gross material by centrifugation at 10,000 r.p.m. for 10 minutes. The supernatant fluids were then ultracentrifuged in each of two tubes at 35,000 r.p.m. for one hour. In both the cultured medium and its control, a barely perceptible opaque pellet was thrown down. The supernatants remained somewhat opalescent. Each pellet was thoroughly dispersed in 1 ml. of 0.1 M. phosphate buffer at pH 7.0. The suspensions were clarified by centrifuging at 10,000 r.p.m. for 10 minutes. When a strong narrow beam of light was passed through the supernatants, a brighter path was exhibited by that of the cultured medium. These two supernatants designated as VP (hog cholera virus pellet) and CP (control pellet) and the two supernatants from the ultracentrifugation VS and CS (hog cholera virus and control supernatants, respectively) were mounted on collodion-coated specimen screens. Preparatory to taking electron micrographs, the gold casting technic of Williams and Wyckoff[3] was used to accentuate the material. The same procedure was repeated with a mixture of cultures 72 and 73.

Electron micrographs of the two sets of VP (virus pellet) and VS (virus supernatant) preparations showed aggregates of minute granular substances. These were not found in the CP (control pellet) and CS (control supernatant) preparations. If these granules represent the virus of hog cholera, then a clear-cut sedimentation of the virus by ultracentrifugation was not accomplished.

Partial Purification by Ammonium Sulfate Precipitation

In order to substantiate these findings, pooled cultures 73, 74, and 75 and another of a different series, IX-33-P2, together with their controls, were subjected to purification by the ammonium sulfate precipitation method. To both cultures dry ammonium sulfate (CA 40%) was added in small quantities until a definite clouding appeared. After chilling, the mixtures were centrifuged at 10,000 r.p.m. for 10 minutes. A clean separation of the precipitate from the supernatant liquid was effected. The whitish precipitate was dissolved in 0.1 M phosphate buffer at pH 7.0, then centrifuged at 10,000 r.p.m. for 10 minutes. The above procedure was repeated with the supernatant liquid. These are designated as VAs and CAs (virus and control ammonium sulfate, respectively).

Specimens for electron micrography were prepared in the usual manner but, after mounting the material, the screens were floated overnight on a large volume of distilled water. In this manner, the contaminating ammonium sulfate was allowed to diffuse through the collodion membrane.

Granular aggregates identical in appearance

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The authors wish to express gratitude for the assistance of Marjorie Adams and Fred Osborne of Cutter Laboratories.

Table I. — Virus Culture Test

Date of Inoculation	Number of Generations	No. of Pig	Dosage	Reaction (Temperature / Visible symptoms)	Results
19-III-48	73	2503	1 cc	T. 4,5,6,7,8 x,s,x	Survived
19-III-48	73	2500	1 cc	T. 3,4,5,6,7,8 x,s,x,x-9	Survived
26-III-48	74	2501	1 cc	T. 5,6,7,8,9,10 x	Survived
26-III-48	74	2502	1 cc	T. 5,6,7 x	Survived
15-IV-48	75	2585	1 cc	T. 3,4,5,6,7,8 s,s,s,s,s-9,x-10,11	Survived
15-IV-48	75	2586	1 cc	T. 4,5,7,8,9 s,s,s,s,x-10,11,s-6	Survived
9-IV-48	75	2550	1 cc	No rise in temperature	Survived
9-IV-48	75	2555	1 cc	T. 4,5,6,7,8,9,10 s,x,x,s,s, x	Survived
23-IV-48	76	2645	1 cc	No rise in temperature	Survived
23-IV-48	76	2649	1 cc	T. 3,4,5,8,9,10,11 s, s	Dead on 5-V-48
30-IV-48	77	2653	1 cc	T. 8,9 s,s	Survived
30-IV-48	77	2654	1 cc	T. 5,6,7,8,9,10,11,12,13 x, x, s, s	Dead on 14-V-48
5-V-48	Ammonium Sulfate Concentrate 73, 74, 75	2685	1 cc	No rise in temperature	Survived
5-V-48	Ammonium Sulfate Concentrate 73, 74, 75	2686	1 cc	No rise in temperature	Survived
25-V-48	Pellet from Ultracentrifuge 75, 76, 77	2735	1 cc	No rise in temperature	Survived
25-V-48	Pellet from Ultracentrifuge 75, 76, 77	2736	1 cc	T. 5,6,7,8	Survived
18-VI-48	Supernatant from Ultracentrifuge 75, 76, 77	2845	1 cc	T. 5,6,9,10,11	Survived
18-VI-48	Supernatant from Ultracentrifuge	2849	1 cc	T. 4,5,6	Survived

T—rise in temperature above 103° F.
4—fourth day after inoculation.
x—animal "slow."
x-9—animal slow on ninth day after inoculation—no rise in temperature recorded.
s—sick.
s-4—animal sick on fourth day after inoculation—no rise in temperature recorded.

Table II. — Immunity Test

Date of Inoculation	Number of Generations	No. of Pig	Amt. of Challenge Dose	Reaction (Temperature / Visible symptoms)	Results
9-IV-48	73	2503	3 cc	T. 6,8	Survived
9-IV-48	73	2500	3 cc	T. 1,2,3,5,6,7,8,10,11 x,x,x,s,s,s,s, s,s, s-4,s-12,13	Survived
9-IV-48	74	2501	3 cc	T. 2	Survived
9-IV-48	74	2502	3 cc	T. 11	Survived
7-V-48	75	2585	3 cc	T. 3	Survived
7-V-48	75	2586	3 cc	T. 5,7,10	Survived
30-IV-48	75	2550	3 cc	No rise in temperature	Survived
30-IV-48	75	2555	3 cc	No rise in temperature	Survived
7-V-48	76	2645	3 cc	T. 3,4,5,6,10	Survived
14-V-48	77	2653	3 cc	T. 3,5,6,7,10,11,12	Survived
21-V-48	Ammonium Sulfate Concentrate 73, 74, 75	2685	3 cc	T. 3,4,5,6	Survived
21-V-48	Ammonium Sulfate Concentrate 73, 74, 75	2686	3 cc	T. 3,4,5,6,7 x	Survived
11-VI-48	Pellet from Ultracentrifuge 75, 76, 77	2735	2 cc	No rise in temperature	Survived
11-VI-48	Pellet from Ultracentrifuge 75, 76, 77	2736	2 cc	T. 6,7	Survived
2-VII-48	Supernatant from Ultracentrifuge 75, 76, 77	2845	2 cc	T. 6	Survived
2-VII-48	Supernatant from Ultracentrifuge	2849	2 cc	T. 6	Survived

T—rise in temperature above 103° F.
4—fourth day after inoculation.
x—animal "slow."
x-9—animal slow on ninth day after inoculation—no rise in temperature recorded.
s—sick.
s-4—animal sick on fourth day after inoculation—no rise in temperature recorded.

with those found in VP (virus pellet) and VS (virus supernatant) were present in the micrographs of VAs (virus ammonium sulfate). These were not found in the CAs (control ammonium sulfate) preparations. On close examination, the aggregates appear to be composed of minute granules measuring about five millimicrons in diameter.

Micrograph of Hog Cholera Virus
The small white granules in the aggregate mass are presumed to be the particles of hog cholera virus

In all, nine different passage cultures were represented in the total number of pools used, with two controls, to prepare, by one or the other method, the micrographs from which these findings are obtained. The same exceedingly minute granules were pictured in every instance.

To substantiate further the findings under the electron microscope, 1cc of the concentrate produced by the ammonium sulfate method from pooled lots of generations 73, 74, and 75 was inoculated into each of two pigs. Each of these generations had been previously tested for virulence on two pigs. Each passage culture had produced a reaction and the inoculated pigs had all survived a challenge dose of blood virus later. The two pigs given the ammonium sulfate concentrate prepared from these lots 73, 74, and 75 showed no effect but they, likewise, were immune to a subsequent injection of blood virus.

The pooled lots of passage cultures 75, 76, and 77 had also been tested in each generation. In the tests on 76 and 77 one of the two inoculated pigs had succumbed before being given a challenge dose of virus and each of the remaining pigs had resisted the challenge dose. The precipitated pellet and the supernatant fluid yielded by ultracentrifugation in preparation for electron micrographic demonstration were injected separately into each of two pigs. These pigs, like the others, proved immune to later inoculation with blood virus. The results are summarized in tables I and II.

The repeated association of the granules revealed by the electron miscroscope in the preparations from virus-cultured medium and their absence from preparations of unseeded control medium as shown by two different methods of partial purification, and the effectiveness of the preparations containing them in immunizing pigs against a challenge dose of blood virus indicate that these granules presumably represent the virus of hog cholera.

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Eradication of Sarcoptic Mange of Hogs by a Single Treatment of Benzene Hexachloride Sprays*

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SARCOPTIC or common mange of hogs, caused by mites known technically as *Sarcoptes scabiei* var. suis, is becoming more prevalent throughout the United States, particularly in the corn-belt area where the swine population is greatest. In that area, hog raisers, veterinarians, farm extension workers, livestock sanitary officials, and meat packers report a definite increase in the incidence of hog mange. They now consider losses caused by this disease as of major economic importance to the swine industry.

The early stages of hog mange are not always readily apparent, and the existence of the disease in a herd, especially among well-fed, vigorous hogs, may be easily overlooked until it has made considerable progress. Then, too, during the warm months of the year mange mites are usually less active than during cold weather. Consequently, the lesions of hog mange are ordinarily less apparent in summer than in winter.

Whenever swine appear restless and rub themselves frequently, the existence of mange in the herd should be suspected and a careful examination made for the presence of mange mites. Otherwise the disease may progress gradually, spread throughout the herd, and cause considerable damage (fig. 1) before resort is had to treatment.

In the early stages, common hog mange is usually first noticed on the head around the eyes, nose, and ears. However, during recent investigation in Nebraska, Peterman and Beagle found that mange mites could often be recovered from lesions inside the ears of swine, when other lesions of the disease were not apparent. They likewise found such lesions in the ears of nearly all mange-infested hogs. These relatively obscure lesions are usually found about half-way down the inner surface of the concha between the cutaneous ridges. The lesions are normally covered with a thin brown scurf which, when removed, exposes the denuded and inflamed area caused by activity of the mange mites.

Heretofore, a number of insecticides, such as petroleum oils, lime-and-sulphur dips, coal-tar creosote dip, and arsenical dip have been used to control mange in swine. Various methods of applying the insecticides to infested swine herds have been used. These include self-oilers, such as home-made rubbing posts or patented oilers; spraying; dipping; or providing medicated wallows. Regardless of the method of application of these insecticides, repeated treatments were usually necessary merely to control, much less eradicate, hog mange, once the disease became established in a herd. As a result, efforts to combat the disease usually have been confined to measures of control rather than eradication.

Peterman, who for many years was assigned to swine disease control work in Nebraska, early recognized the enormous toll taken, each year, by swine mange in that state. He brought this to the attention of Nebraska livestock sanitary officials, veterinarians, extension service personnel, and swine raisers. As a result, tests were carried out during September 1946 with sprays containing benzene hexachloride as a treatment for hog mange. The tests were conducted by extension entomologists of the University of Nebraska College of Agriculture in cooperation with veterinarians of the U. S. Bureau of Animal Industry. The results of these tests, as reported by Muma[1], showed that one thorough coverage of mange-infested swine with benzene hexachloride spray, containing 0.25% gamma isomer, completely freed the animals of sarcoptic mange.

The 0.25% gamma isomer spray used in the 1946 Nebraska tests required the use of 20 pounds of a wettable benzene hexachloride powder, containing 10% gamma isomer, in each 100 gallons of water. This relatively high gamma isomer concentration is considerably greater than that commonly used, with success, against such livestock parasites as lice, ticks, and sheep keds. Therefore, the principal object of the tests described in this paper was to determine if sprays containing lower percentages of the gamma isomer would prove as effective against hog mange as that used in the Nebraska work. Other determinations made in the course of the work here reported included observations on the time required to kill mange mites on swine by sprays containing different percentages of the gamma iso-

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mer, and how long the musty odor of such sprays remained on treated hogs.

Materials and Methods

The investigations were conducted during October and November 1947 in northeastern Nebraska, where swine raising is a major farm industry and where the incidence of sarcoptic mange in hogs is relatively high.

Animals involved.—Three mange-infested farm herds of swine, comprising a total of 188 animals of all ages, from mature sows to suckling pigs, were selected for the tests. In each herd the severity of mange ranged from light, benign cases on some animals to advanced cases of long standing on others. The herds were allowed the run of their usual premises, which were not cleaned or disinfected throughout the duration of the tests.

Composition and preparation of sprays.—A wettable, 50%, benzene hexachloride powder containing 6.5% gamma isomer was stirred into unheated water to prepare the sprays used in these tests. One herd was treated with spray containing a concentration of 0.26% gamma isomer (3.32 pounds of the wettable powder in 10 gallons of water); another herd with spray containing 0.195% gamma isomer (2.49 pounds of the wettable powder in 10 gallons of water); and the third with spray that contained 0.13% gamma isomer (1.66 pounds of powder in 10 gallons of water).

Method of applying sprays.—All swine in each herd were first confined in their shelter. A few of the animals, four to eight in number, depending upon their size, were then driven into a small pen within the shelter for treatment. The entire body surface of each animal, including the inside of the ears, was wet thoroughly with the spray. The liquid was applied in a coarse-droplet spray at about 40 pounds nozzle pressure from a hand-operated, barrel-type orchard sprayer that was equipped with an agitator. To facilitate wetting the under surfaces of the swine, the spray nozzle was attached, at an angle of 45°, to the end of a four-foot extension pipe.

An average of only one-half pint to two pints of spray was required to cover the smaller pigs thoroughly, whereas one to three quarts was required for the larger animals. When baby pigs were present, they were hand-dipped momentarily in the sprayer tank.

Method of examining swine.—Just prior to spraying each herd, skin scrapings were taken from active, superficial lesions and from beneath thickly crusted-over lesions on those animals in each herd that showed the most active and advanced cases of mange. The scrapings were examined under a low-power microscope, and living sarcoptic mange mites were demonstrated in all such scrapings. The animals from which the scrapings were taken were then eartagged for identification. Immediately after each herd was sprayed, skin scrapings were again taken from lesions on the tagged animals at hourly intervals. Thereafter, the tagged animals and other representative swine in each herd were caught and examined, and skin scrapings were taken from them at weekly intervals for seven weeks. The treated herds were then closely observed for evidence of the recurrence of mange at monthly intervals for six months.

Results

1. The aqueous suspensions of benzene hexachloride containing 0.13, 0.195, and 0.26% gamma isomer, used once by thoroughly spraying all animals in three mange-infested swine herds, completely eradicated the disease from the three herds.

2. Skin scrapings taken from mange-infested swine at hourly intervals after spraying showed that sprays containing 0.13, 0.195, and 0.26% gamma isomer destroyed all mange mites in about six hours, four hours, and two hours, respectively.

3. No living mange mites or evidence of active mange was found on the treated swine during weekly examinations throughout a period of seven weeks after treatment. Thereafter, monthly observations of the herds revealed no evidence of the recurrence of mange.

4. None of the benzene hexachloride suspensions used produced any visible discomfort or damage to the treated swine. The musty odor of benzene hexachloride could be detected on the treated animals for only about two days, but persisted in the shelters where the animals were sprayed for about three weeks.

Discussion

The results of the tests recorded in this paper corroborate those reported earlier by Muma[1]. Moreover, they show that benzene hexachloride sprays, containing as little as one-half the percentage of gamma isomer used by Muma, were effective against sarcoptic hog mange.

As originally planned, the work described in this paper was to include the treatment of a fourth, mange-infested herd with benzene hexachloride spray containing only 0.065% gamma isomer. Unfortunately, however, the conduct of such a test was prevented by the occurrence of a prolonged period of cold and rainy weather. It is not known, therefore, if sprays containing less than 0.13% gamma isomer would also prove effective in eradicating sarcoptic hog mange.

The intense pruritus and general irritation

that are caused by sarcoptic mange mites on swine, as indicated by the incessant restlessness of the host animals and by the frequent rubbing against any available object, were no longer evident on the treated swine the day following the application of the benzene hexachloride sprays. The pigs were observed to be

Fig. 1. A well-developed case of mange showing characteristic wrinkles in the skin

resting comfortably, and the owners reported an immediate increase in their feed consumption. As a result, the thriftiness and general condition of the swine in each treated herd improved rapidly. At the end of two weeks only those animals that had previously had advanced cases of mange showed any evidence of having had the disease. During this time, the previously staring and broken hair coats of the more lightly infested animals became sleek and their skin regained a normal appearance. The heavily-crusted, leather-like areas of skin on animals that had advanced cases of mange gradually became loosened and dislodged leaving a healthy skin and hair coat in its place. However, it required approximately two months for all such areas to clear up completely.

Since hog mange had been persistent for several seasons in the three swine herds involved in the tests, despite repeated attempts to control the disease with various medicaments, the owners of the animals were quite enthusiastic over the rapid and successful results obtained with the benzene hexachloride sprays. They reported that the swine so treated were the most thrifty and profitable that they had raised for several years.

The importance of thoroughly wetting the entire body surface and the insides of the ears of mange-infested swine, when spraying them for this disease, was brought out by some of the earlier work in Nebraska. In some herds, where thoroughness of application of the benzene hexachloride sprays was questionable, mange recurred even though the sprays used contained as much as 0.25% gamma isomer. It is, therefore, reasonable to conclude that the success or failure of benzene hexachloride sprays containing 0.13 to 0.26% gamma isomer, as remedies for hog mange, depends more upon their thorough application than upon their gamma isomer content.

During the progress of the work reported in this paper, it was noted that the swine dried off very rapidly when exposed to sun and wind immediately after being sprayed. Therefore, to allow time for the spray materials to soak through the scurf and scabs on infested hogs and reach the underlying mange mites, the animals were kept in their shelters for about two hours following treatment.

Programs for the eradication of sarcoptic hog mange on farms can, in all probability, be more easily and economically accomplished during the late fall or winter months in most swine-raising areas. The herds then usually consist of a few brood sows and gilts, a boar, and perhaps some summer and fall pigs. The larger animals can be sprayed readily and the smaller, more easily handled pigs, dipped in some inprovised tank.

Conclusions

1. Sarcoptic hog mange, in all its stages of development, was completely eradicated from swine herds by one thorough application of benzene hexachloride spray that contained 0.13, 0.195, or 0.26% gamma isomer. The mange mites were destroyed on the swine by these sprays in approximately six, four, and two hours, respectively.

2. The benzene hexachloride sprays used produced no visible discomfort or damage to the treated swine. The musty odor of the insecticide could be detected on the animals for only about two days following its application.

3. An early and progressive improvement in the thriftiness and general condition of the treated swine occurred following application of the benzene hexachloride sprays. The swine owners were thoroughly satisfied in every respect with the treatment and the results.

4. In comparison with hog mange remedies used heretofore, the simplicity, safety, economy, and effectiveness associated with the preparation and use of benzene hexachloride sprays for the eradication of hog mange should give impetus to the elimination of that costly disease wherever it exists in swine herds.

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Dosage and Serum Level of Streptomycin in Horses*

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SINCE in-vitro studies on pathogenic organisms of equine origin indicated that streptomycin** should be of value for treatment of certain infections in horses, this investigation was undertaken to establish serum level responses to various doses of the antibiotic. Pathogenic bacteria isolated from horses have been found to vary in susceptibility to the action of streptomycin within species as well as between species. It is obvious, therefore, that knowledge of the serum level response to various doses of streptomycin is necessary for effective treatment of equine infections. Of common equine diseases, *Shigella equuli* infection of foals appears to be the most likely to respond to streptomycin treatment. Clinical use of streptomycin for this disease will be the subject of a subsequent report.

Methods

All horses used in this investigation were apparently healthy and had free access to feed and water throughout the test periods. Suckling foals, yearlings, and adult horses were used. All doses were injected at one site in the musculature of the neck. The doses, accurately measured in units per pound body weight, were administered at three-hour intervals in a series of five injections. Samples for assay were obtained aseptically from the jugular vein at hourly intervals from the first through the fifteenth hour following the first injection in most trials. In others the first sample was taken one hour following the third injection. The method of assay was the modification of that of Price, Nielsen, and Welch[1], as previously reported.[1,2]

Results

In the majority of the dosage trials, the serum levels for the three hours following the first injection were approximately one-half that obtained for each succeeding three-hour period between injections. In other trials the levels during the first three hours were comparable to those obtained after subsequent injections. In general the serum level response reached a uniform trend following the second or third injection and continued within closely confined limits throughout the test period. The serum levels for equal doses per pound of body weight varied in horses of different ages and weights, with a tendency for higher serum concentrations in the heavier animals. The difference was more apparent between the adults and the foals and yearlings as a group than between the foals and yearlings. The serum levels of the suckling foals more nearly approached those of the yearlings as the foals became older and heavier. Fluctuation in serum levels within a three-tube range in the two-fold serial dilution procedure occurred within the successive three-hour injection periods in some dosage trials. Ordinarily the fluctuation within succeeding three-hour periods was between two serum dilutions. In some trials the serum level was consistently at the same concentration from the seventh through the fifteenth hour.

Since the serum level trend usually was not uniformly established until the first hour following the third injection, the serum concentrations for the seventh through the fifteenth hours will be discussed. With doses of 0.5 mg/lb of body weight, the serum levels for young foals during the seventh through the fifteenth hour periods fluctuated from 1.0 to 2.0 units/ml of serum. A level of 0.5 unit/ml was obtained at the ninth hour in one trial. For the yearlings the 0.5 mg/lb dose produced serum levels varying from 0.5 unit/ml for two samples in one trial to 2.0 units/ml. The general trend in the yearlings was somewhat higher than for the foals. In two mares the 0.5 mg/lb dose maintained levels between 2.0 and 4.0 units/ml of serum during the seventh through the fifteenth hour periods, with most samples being 4.0 units/ml. Table I.

For doses of 1.0 mg/lb of body weight, serum concentrations in the young foals during the seventh through the fifteenth hour periods varied from 2.0 to 8.0 units/ml. Values of 8.0 units/ml occurred four times, with levels of 4.0 units/ml for the remaining samples in two determinations on larger foals. Levels of 2.0 units/ml frequently occurred at the second and third hours following successive injections in the smaller foals. Serum levels for the yearlings varied from 2.0 to 8.0 units/ml during the seventh through the fifteenth hour periods. Levels of 2.0 units/ml were obtained at the third hour following both the third and fourth injections in one trial. Serum levels of 4.0 to 8.0 units/ml were obtained for all hourly samples from the seventh through the fifteenth hours in four other yearlings. For one

*The investigation reported in this paper is in connection with a project of the Kentucky Agricultural Experiment Station and is published by permission of the Director.

**The streptomycin used in this investigation was supplied through courtesy of Merck and Company Inc., Rahway, New Jersey.

Table I.—Serum levels of streptomycin with doses of 0.5 mg per pound of body weight at 3-hour intervals

Weight in pounds	Dose in mg	Dose micrograms or units	Units per ml of serum at specified hours following first injection														
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
500	250*	250,000	-	1.0	1.0	0.5	1.0	1.0	1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0	1.0
480	240*	240,000	-	1.0	1.0	0.5	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0	2.0
380	190*	190,000	-	1.0	1.0	0.5	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0	1.0
420	210*	210,000	-	1.0	1.0	0.5	2.0	1.0	0.5	2.0	1.0	0.5	2.0	1.0	0.5	2.0	1.0	1.0
930	465	465,000	-	1.0	1.0	1.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
1000	500	500,000	-	2.0	2.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0	4.0	2.0
125	62.5	62,500	-	0.5	0.5	0.25	1.0	0.5	0.5	2.0	1.0	0.5	2.0	1.0	1.0	2.0	1.0	1.0
160	80	80,000	-	1.0	1.0	0.5	2.0	1.0	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	1.0
150	75	75,000	-	1.0	0.5	0.5	1.0	1.0	0.5	1.0	1.0	1.0	2.0	2.0	1.0	2.0	2.0	1.0
570	285	285,000	-	-	-	-	-	-	-	2.0	2.0	1.0	2.0	2.0	1.0	2.0	1.0	1.0
Streptomycin injection			1			2			3			4			5			

*Streptomycin hydrochloride. Unmarked doses were streptomycin calcium chloride complex.

animal the level was 4.0 units/ml of serum throughout the test period. For two mares, serum levels of 4.0 to 8.0 units/ml were maintained throughout the seventh through the fifteenth hour periods, with values of 8.0 units/ml in the majority of samples. Table II.

Using doses of 2.0 mg/lb of body weight in foals, serum levels that fluctuated from 4.0 to 16.0 units/ml were obtained during the seventh through the fifteenth hour periods. Concentrations of 16.0 units/ml of serum were obtained only at the first hour following succeeding injections. Levels of 8.0 units/ml of serum occurred for the second and third hours

Table II.—Serum levels of streptomycin with doses of 1 mg per pound of body weight at 3-hour intervals

Weight in pounds	Dose in mg	Dose in micrograms or units	Units per ml of serum at specified hours following first injection														
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
530	530	530,000	-	-	-	-	-	-	-	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
500	500*	500,000	-	4.0	2.0	2.0	8.0	4.0	2.0	8.0	4.0	4.0	8.0	4.0	4.0	8.0	8.0	4.0
480	480*	480,000	-	4.0	4.0	2.0	8.0	8.0	4.0	8.0	4.0	4.0	8.0	4.0	4.0	8.0	8.0	4.0
380	380*	380,000	-	4.0	2.0	1.0	4.0	4.0	2.0	4.0	4.0	4.0	8.0	4.0	4.0	8.0	8.0	8.0
420	420*	420,000	-	4.0	2.0	1.0	4.0	4.0	2.0	8.0	4.0	2.0	4.0	4.0	2.0	8.0	4.0	4.0
870	870	870,000	-	4.0	4.0	2.0	4.0	4.0	4.0	8.0	4.0	4.0	8.0	8.0	4.0	8.0	3.0	4.0
750	750	750,000	-	4.0	4.0	2.0	8.0	4.0	4.0	8.0	4.0	4.0	8.0	8.0	8.0	8.0	8.0	4.0
130	130	130,000	-	2.0	1.0	0.5	2.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0	2.0	4.0	4.0	2.0
170	170	170,000	-	2.0	4.0	1.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0
85	85	85,000	-	2.0	2.0	1.0	4.0	2.0	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0	4.0	2.0
225	225	225,000	-	-	-	-	-	-	-	8.0	8.0	4.0	8.0	4.0	4.0	4.0	4.0	4.0
220	220	220,000	-	-	-	-	-	-	-	4.0	4.0	-	8.0	4.0	4.0	4.0	4.0	4.0
Streptomycin injection			1			2			3			4				5		

*Streptomycin hydrochloride. Unmarked doses were streptomycin calcium chloride complex.

Table III.—Serum levels of streptomycin with doses of 2 mg per pound of body weight at 3-hour intervals

Weight in pounds	Dose in mg	Dose in micrograms or units	Units per ml of serum at specified hours following first injection															
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
430	860*	860,000	-	8	8	4	16	8	8	8	8	8	16	8	8	16	16	16
410	820*	820,000	-	8	4	4	8	8	8	16	8	8	16	16	8	16	16	8
310	620*	620,000	-	8	4	4	8	8	4	16	8	8	16	8	8	16	16	8
520	1040*	1,040,000	-	8	8	4	8	8	8	8	8	8	16	16	8	8	16	8
830	1660	1,660,000	-	16	8	8	32	16	16	32	16	16	32	16	16	32	16	16
925	1850	1,850,000	-	8	16	16	16	16	8	32	16	16	32	16	16	32	32	16
150	300	300,000	-	4	4	4	8	8	8	8	8	8	16	8	8	16	8	8
150	300	300,000	-	8	4	2	8	8	4	16	8	8	16	8	8	16	8	4
505	1010	1,010,000	-	-	-	-	-	-	-	8	8	8	16	8	8	16	8	8
230	460	460,000	-	-	-	-	-	-	-	8	8	8	16	8	8	16	8	8
225	450	450,000	-	-	-	-	-	-	-	16	8	4	16	8	8	16	8	8
220	440	440,000	-	-	-	-	-	-	-	8	8	4	16	8	8	16	8	8
Streptomycin injection			1			2			3			4			5			

*Streptomycin hydrochloride. Unmarked doses were streptomycin calcium chloride complex.

following each injection, except for levels of 4.0 units/ml at the ninth hour in two trials and at the fifteenth hour in one trial. In the yearlings, all serum concentrations for the seventh through the fifteenth hours were within the 8.0 to 16.0 units/ml range. Levels of 16.0 units/ml frequently occurred at the second hour periods after the fourth and fifth injections. Doses of 2.0 mg/lb in two mares produced serum levels varying between 16.0 and 32.0 units/ml for the seventh through the fifteenth hour periods. Levels of 32.0 units/ml of serum were uniformly present at the first hour following the third, fourth, and fifth injections. Table III.

Dosage trials with 4.0 mg/lb of body weight were made on five foals and one yearling. There was no apparent difference in the serum levels of the yearling and the foals. For the seventh through the fifteenth hour periods, serum levels ranging from 8.0 to 32.0 units/ml were obtained. Levels of 8.0 units/ml of serum

Table IV.—Serum levels of streptomycin* with doses of 4 mg per pound of body weight at 3-hour intervals

Weight in pounds	Dose in mg	Dose in micrograms or units	Units per ml. of serum at specified hours following first injection																
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
150	600	600,000	-	16	8	8	32	16	16	16	16	8	16	16	16	16	16	16	-
150	600	600,000	-	8	8	8	16	16	16	32	16	8	32	16	16	16	16	16	-
170	680	680,000	-	16	16	2	16	16	8	16	16	16	32	16	16	-	-	-	-
200	800	800,000	-	16	16	8	16	16	8	32	16	16	32	16	16	32	32	16	-
420	1680	1,680,000	-	-	-	-	-	-	-	16	16	16	32	16	16	32	16	16	-
250	1000	1,000,000	-	-	-	-	-	-	-	32	16	8	32	16	16	32	16	16	-
Streptomycin injection			1			2			3			4			5				

*Streptomycin calcium chloride complex.

occurred at three hours following the third injection in two trials. Except in one trial at the second hour following the fifth injection, concentrations of 32.0 units/ml were present only at the first hour following succeeding injections. Concentrations of 16.0 units/ml were the most frequently occurring serum values. Table IV.

Summary

With intramuscular injection of streptomycin at three-hour intervals, doses of 0.5 mg/lb of body weight will usually maintain serum concentrations of 1.0 to 2.0 units/ml following the third injection in young foals and small yearlings, with a slightly higher trend in yearlings. In adult horses this dose maintained serum levels between 2.0 and 4.0 units/ml.

In general, doses of 1.0 mg/lb of body weight resulted in serum levels of 2.0 to 4.0 units/ml in foals, 4.0 to 8.0 units/ml in yearlings, and 4.0 to 8.0 units/ml in adults. The levels had a

higher trend within the 4.0 to 8.0 units/ml range for adults than for yearlings.

In foals doses of 2.0 mg/lb of body weight resulted in levels varying from 4.0 to 16.0 units/ml of serum, with 8.0 units/ml being the most frequently occurring value. For yearlings the serum levels varied between 8.0 and 16.0 units/ml, at a higher trend than for the foals. Serum levels for adults varied from 16.0 to 32.0 units/ml.

In foals doses of 4.0 mg/lb of body weight produced serum levels that varied from 8.0 to 32.0 units/ml of serum, with 16.0 units/ml being the most frequently occurring concentration.

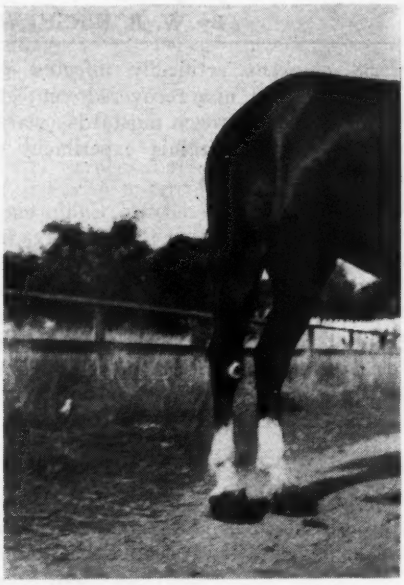
Generally, a two-fold increase in doses resulted in doubling of the serum concentrations obtained for the respective age groups, foals, small yearlings, and adults.

References

1. Price, C. W. Nielsen, J. K., and Welch, H.: The Estimation of Streptomycin in Body Fluids. *Science* 103, p. 56. 1946.

2. Doll, E. R. and Wallace, M. E.: Dosage and Blood Level of Streptomycin in Sheep, *J.A.V.M.A.* 113, pp. 55-59. 1948.

Indolent Wound of the Hock



The hock lesion shown in the above illustration is on a gelding used on a milk delivery wagon. Because he is a show horse the owners are anxious to obtain healing without a blemish. The lesion is not sensitive and causes no lameness. The swelling, or connective tissue proliferation, is such that the surface of the lesion stands out about 1½ inches beyond where the flexor surface of the hock should be.

The swelling is soft. The raw surface is dry but is not covered by a scab. It is surrounded by a margin of hairless skin about one and one-fourth inches wide.

The injury was caused by a rope burn six months ago. It was treated by the stable foreman with "Brigg's Black Oil"—whatever that may be. This horse was kept at work for a couple of weeks, but the leg began to swell and he was laid off and has not worked since.

The owners are anxious for a definite prognosis. Will the wound finally heal without a blemish? Will the animal be useful on a milk route and if so when? When will the raw area be healed over? To the first question I have answered, "No, there will remain a slight permanent enlargement and a hairless area", to the second question, "Yes", to the third, It will do no harm to begin working the animal at once, and in reply to the fourth question, I have estimated it will require one to two months for healing to be complete. Do readers agree?—H. H. Hodgson, Stamford Centre, Ont.

Veterinary Problems in Poultry Production

By W. R. HINSHAW, D.V.M., Ph.D., Davis, California

Of 38 chickens artifically infected with fowl leucosis virus, nine recovered completely after injection of nitrogen mustards (war gas chemicals) at the Virginia experiment station.

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Wilson of the University of California reported on the effects of air temperatures from 70 to 105° F. on White Leghorn pullets. The body temperature rose when the air temperature exceeded 80° F. and the rise became marked at 90° F. The birds were not able to tolerate temperatures of 105°F. for longer than seven hours. Water consumption at 95° F. was double that at 70° F.

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Cantor and McFarlane (*Poultry Sci.* 27, p. 350, 1948) made extensive studies to determine the incidence of Salmonella in and on chicken eggs. They reported that Salmonella isolations were made from more eggs in the four lower U. S. Grades than in the four higher U. S. Grades. The ratio of the contaminated eggs in the two groups was approximately 9 to 1.

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Gregory (*Poultry Sci.* 27, p. 359, 1948) in a study of Salmonella infection of turkey eggs, found that these organisms can penetrate the shell when smeared on the surface, thus verifying the results of Schalm (*J. Inf. Dis.* 61, p. 208, 1937) and Pomeroy and Fenstermacher, (*Am. J. Vet. Res.* 2, p. 285, 1941). He also found that 12 types of Salmonella and two types of paracolons were not inhibited by egg albumin and in some instances grew well in it.

—♦—

Jull (*World's Poultry Sci. J.* 4, p. 154, '48) quotes an exhaustive study by Yamashina in which he concludes that in chickens the male has 38 pairs of autosomes and two sex chromosomes, and the female has 38 pairs of autosomes and one sex chromosome.

These new data, which Jull accepts as conclusive, are in contrast with the data previously accepted by most geneticists, which indicated that the male chicken had 17 pairs of autosomes and two sex chromosomes, and the female, 17 pairs of autosomes and one sex chromosome.

Morris (Am. J. *Vet. Res.* 9, p. 102, 1948) has developed a modified complement fixation test for the detection of ulcerative enteritis in quail. By use of this test it is possible to detect carriers of the disease in quail that have survived an outbreak.

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Anderson and Briggs of the University of Maryland found that New Hampshire chicks preferred orange colored feed to red, blue or white. Of the total feed consumed in three experiments, the chicks ate the following percentages of the colored feeds: orange, 33.6; blue, 27.8; white 20.5 (control) and red, 18.1.

—♦—

Mueller of the Kansas experiment station recommended artificial insemination as a useful procedure in Progeny Test Breeding Programs. The procedure, according to him, is especially useful following changes of sires in breeding pens, and for improving fertility in old breeders or where males fail to mate properly with the females. Another use is to utilize an important male for an increased number of females. With proper equipment, one operator can collect semen samples and mate hens at the rate of 100 per hour, with matings required one or two times per week.

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Several investigators have called attention to the possibility of hexachlorocyclohexane imparting undesirable flavors to eggs and poultry meat, following its use as a louse remedy. Miller *et al.* of Washington Experiment Station used three commercial roost paints containing this chemical. None of the products tested were without some undesirable effect on meat and eggs, but there was considerable variability in the odor and flavor imparted by them. A musty odor exuded during the process of cooking and a musty flavor of the cooked meat are characteristic. Some recent investigations have indicated that the musty odor or taste may be due to impurities rather than to the chemical itself. Veterinarians should warn poultrymen of the possible effects of delousing agents containing hexachlorocyclohexane when used in laying flocks, or for birds that are to be used soon for meat purposes.

Reflections on the Planning of Small Animal Hospitals

By Horst Schreck
El Paso, Texas

THE "animal hospital" is a supply to a demand. The demand is created by the universal failure of animals to maintain permanent good health, or by the desire of their owners to have certain operations performed on his property.

The veterinarian is the logical one to satisfy this demand. In this condition some men see a natural process of everyday life and they conduct their business accordingly. They have an office and kennels, also bottles filled with liquid medicines or tablets. They also have a few instruments and, in the course of events, they contrive to bring these different elements together for a certain effect upon an animal in their charge. This accomplished, the transaction is over, and the animal's owner is supposed to pay for the phenomenon.

Other veterinarians see, in these circumstances, an opportunity. They realize that their training, together with good business practice, has placed them in a position to render their community a real service. The primary purpose of a small animal hospital is: To afford the veterinarian an opportunity to apply the knowledge, experience and skill of his profession to animals in his care with satisfaction to his clients and profit to himself. The hospital should be an asset to the community and afford its inhabitants a means of having their pets and other domesticated animals properly hospitalized and treated by a competent veterinarian whose skill and service are in keeping with his fees, which must be reasonable and just. A Veterinary Hospital should afford its owner a profit. This profit should be an item altogether separate from the profit that his practice should produce, i.e., from the fees for his professional service. This hospital profit must be the result of capital investment and hospital management. For that reason, it is logical that the hospital of a very mediocre veterinarian of business acumen and superior managerial ability will often outstrip that of a good veterinarian lacking these qualifications.

In building projects, the one thing that is, and always will be, in the front rank is *value*. Value is not cost. Value is the scale of return on investment. A $10,000 building with an 18% gross return has greater value than a $50,000 structure affording a 10% gross return. What then creates value in a building? It is the proportion of lot area to productive area. In other words, value is found in that building that presents a large productive proportion in comparison to its non-productive proportion.

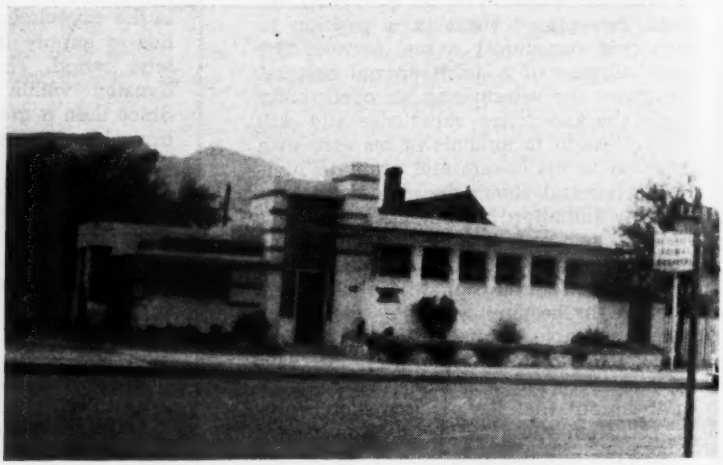
Any or all of the non-productive units are necessary to give value and make possible the use of the few productive units. It readily can be seen that they may completely submerge the productive portion of the hospital. Their

This article by Doctor Schreck is reprinted from the January, 1946 issue in response to many requests. When the special issue on animal hospital planning and construction was published, several hundred extra copies were printed in the expectation they would suffice to supply the demand for a long period. The supply was exhausted within a few months. Since then a great many requests have been received for copies of it. In fact there has been little abatement of the demand to the present date.

The discussions in this issue are so broad as to include the planning and construction of every type of animal hospital, from the least expensive to the deluxe installation, and all sorts of alteration and remodelling. Hence, they contain information needed at one time or another by most practitioners. Even though they be well supplied with hospital facilities, the time is unpredictable when a change in practice may necessitate alterations in facilities or the construction of new ones at a different location. Of course, catastrophes such as fires that may require remodelling or new construction cannot be foreseen. It is urged that readers preserve this copy as, in fact, they should preserve all their copies of VETERINARY MEDICINE.

encroachment upon the total available area is so insidious, that it is possible they may become completely parasitic and choke all possible profit out of a building. Mere elimination of their names will not eliminate this danger or cure the condition, for their presence is always real, and the expedient of ignoring them does not annul them. They may be consolidated and the inactive space of one unit serve as the inactive space of another, but they will ever be a sizable load on Mr. Overhead's shoulder.

The deeper we probe our problem, the more we become aware of the fact that it is essential that we have a well defined, mental plan of what we expect to do, before we can even make a rational start at planning a hospital. The policy and purpose, with an outline of the proposed management, must be well defined and, once established, it must be adhered to without deviation. A sound principle conscientiously followed will, eventually, result in a sound outcome. All who will be active in the management and the operation of the hospital, should be taken into consultation with the designer, to attempt to bring to materialization those points that are known to each to be of value in his particular department.



This attractive hospital, now operated by Dr. Duane Cady, was built by the author. It includes all the desirable features mentioned in this article. It will be noted that full advantage is taken of light and air. Outdoor runs extend a considerable distance beyond the right margin of the photograph and there is ample parking space, not shown, at the left. The hospital is in a business district of El Paso, Texas, on U. S. 90, the southern route from coast to coast, 822 miles from Los Angeles, 2089 miles from New York.

The purpose of each unit must be clearly foreseen. The equipment to go therein clearly visualized and accounted for. No equipment will find its own place if the designer has not the foresight to provide for it. In a hospital, as in a residence, we must be aware that each cubic foot of space consumed reduces our available funds. It is an absolute impossibility to build as complete a layout for $8000 as can be done for $20,000. Promoters can do this; builders cannot. If we assume then that we can build a reasonably complete hospital on a given lot for $15,000, we must realize that the only way open to us with only $10,000 available, is to reduce the quality of the building or the floor area or the cubic content of the structure. The total cost of the building can be lowered very little by reducing the quality of the building material. Change of building type will do more in this respect. In fact, we can reduce the building standard so low that it becomes a mere shed—under the pretense of being a veterinary hospital. The most efficient way to bring our building program within our financial sphere is to shrink our ambitions to the hard realities of building economics. Consolidation will do the trick. Elimination and consolidation must be the key of the program. Certain units of both productive and non-productive character, can neither be consolidated nor eliminated. With this conception clearly in mind, proceed with your plan to build a hospital to accommodate a certain number of animals. Daily notes on ideas bearing on the planning and equipment of the hospital are of great value. Eventually they will have to be simmered down and the impractical, or otherwise unsuited, eliminated.

Equipment

Equipment is of two kinds:

1. Permanent or stationary (built-in, fixed) equipment.
2. Movable equipment.

Both kinds of equipment require the same consideration in planning. The one, in the planning the hospital building as a whole and the other in the planning of the elements (units) of which it is made up. Adequate units or elements will usually be the result of properly placed movable equipment. The satisfactory hospital will be the result of well

planned elements and equipment arranged in a logical, practical and economical manner.

Built-in or fixed equipment requires structural provision to take care of it in the building. It may require heating, plumbing, ventilating or electrical connection to render it useful. Movable equipment is as essential as fixed equipment and must be allotted its proper amount of floor or wall space to make it useful. Its character, size and position must be accurately predetermined and definitely provided for.

In general built-in equipment will consist

Judicious use of empty wall spaces in passages, provides much needed shelving and cabinet space. This passageway from the examination room to the surgery serves as a conveniently located drug room

of laboratory and pharmacy equipment, built-in cases, counters, bins and shelving of all kinds, special and general plumbing fixtures, X-ray equipment, sterilizing apparatus, kennels, heating and bathing facilities, etc.

Movable equipment may comprise kennels, chairs, desks, tables, filing cases, operating tables, examining tables, basin, instrument and irrigation stands, cabinets, anesthetizing apparatus, tray carts, janitor equipment and a host of other things—all absolutely essential to the successful operation of a veterinary hospital. The matter of predetermining and locating all equipment is of prime importance in planning the building that is to receive it. Nor is it advisable to assume a size of a room and then try to fit the equipment, either fixed or movable, into it. The process must be reversed. The function of each element must be clearly visualized, all equipment to go therein carefully listed and a suitable and economic arrangement of it worked out, in this manner determining the room size. Whenever the locating of equipment is an afterthought, a cluttered up hospital that does not function properly is the result. This is especially true as it pertains to the plumbing and electrical connections. If the various rooms turn out to be too large for convenient and effective arrangement of working spaces cubic contents that have cost real money have been wasted but if the rooms are too small, inefficient operation and consequent increased overhead result. Too often such haphazard methods lead to continual readjustment and rebuilding with subsequent increased costs.

Hence, one of the fundamentals of hospital planning is the early determination of administrative and operating policy. Hospital size is determined by the number and size of the elements. Room size is determined by the equipment placed therein, and equipment is determined by the demands, requirements and ideas of the builder as to what a veterinary hospital should be. On paper the wildest fancies may be allowed to run amuck; but, as the costs are studied it will doubtless be found necessary to pull many of these fancies up to the snubbing post. However, with real analytical and constructive thought much can be done to preserve most of the salient points.

An important consideration will be the building site. This should be left to the last. If possible the final decision on this important item should be held off until area and other important items have been reasonably well determined. Of course in the majority of cases the building site is already in the builder's hands and was chosen with a view to favorable location. There are, however, so many other considerations, like geographic exposure, etc., that haste should be made slowly. Individual preference, of course, carries great weight. In large building enterprises this error is avoided whenever possible, and pure building economics are usually the guiding factor. If the building site has been decided in advance nothing further can be done about it.

Next will come a decision as to the number of kennels of various kinds. The proposed kennel management policy for both sick animals and boarders. This will to some extent influence the amount of open space joining the building that is required or desirable. The method of veterinary attention to the animals appears next and will establish the type

of examining room, the desirability of separate surgery or work room, the bathing and clipping facilities and feeding provision. After all these items have been considered in their proper relation we revert to the non-productive units, starting with the reception room, which should be given studied thought.

The determination of the number of kennels is an indefinite task. Formulae have been provided for it, but actual practice has often upset them. Taken as a whole, the average percentage of large dogs, very small dogs, average sized dogs and of cats is fairly constant. Assuming a hospital of 50 kennels, plans should be made for eight large kennels, eight small kennels and 34 kennels of standard size. This may vary in different parts of the country, and practitioners who have kept records in the district in which one is interested may be able to give us more exact data. The guiding unit of all hospital construction is the bed. In veterinary hospital construction it is the kennel. The kennel more than all else governs the planning and ultimate size of the hospital. For the present kennel construction will not be discussed, but the size of kennels, like the number is important. Coming back to the 50 kennel requirement, the space needed will be:

8 large kennels (3x6)—18 square feet each or a total area of 144 square feet.

8 small kennels (2x2)—4 square feet each or a total area of 32 square feet.

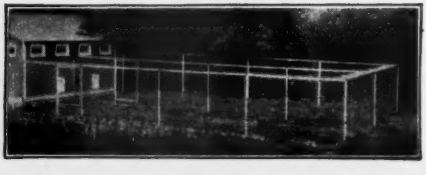
34 standard kennels (3x3)—9 square feet each or a total area of 306 square feet.

This gives an aggregate area of 482 square feet.

Therefore 50 average kennels absorb a floor space of nearly 500 square feet. Some of these should have outside runs according to location and now is the time to arrange for these, based on the following considerations:

1. Exposure to natural light and air.
2. Access and intercommunication.
3. Cleaning facilities.
4. Relative location to other proposed units.

Kennels should be divided off into various wards according to their purpose. The number of wards should depend largely upon the proposed size of the hospital. In the large hospitals designed to care for a comparative large number of cases of the various ailments, the segregation of patients into the various groups resulting in the best room size. The best room



in separate wards, should be considered. Of necessity in small hospitals the consolidation of these groups into two wards should be considered. Perhaps, one for all cases except distemper and the other for isolation cases. It must not be assumed that this segregation will solve the distemper problem in a hospital; however, it will aid materially in its control.

The ultimate cost of a hospital will be determined by the efficient arrangement of all units Every conceivable arrangement should be thought of and tried out on paper. Some will be of no value at all while others will lead on toward perfection in the distribution of equipment. It is possible by careful and studied planning to lower the hospital cost as much as 50%. Just an elementary example will serve to illustrate this point. Assume that the 50 kennels heretofore mentioned are placed into two wards; one ward of 16 kennels and the other of 34 kennels. A hospital that would lay claim to pretentiousness would arrange its kennels so as to give the maximum of appearance, space and light. Let this be "Hospital A." Another hospital whose owner is not financially flush and whose business does not stand the pressure of top prices, finds it necessary to economize on space to the limit. Let this be "Hospital B." Each hospital has found it practical to place a drug station into every ward.

In Hospital B economy of space is essential, double decking of kennels is permissible and since all kennels are placed against the outside walls, sky lights are employed or high windows eight to ten feet from the floor.

Counting the building cost per square foot for each hospital to be the same: The following illustrates the comparative cost of the two structures: The same would hold true for any other unit of the hospital. Hospital A would have a reception room, office, examining room, surgery, pharmacy, work room, bath and clipping facilities, kitchen—each an individual unit while Hospital B would have the reception room and office combined, an examining room, pharmacy, surgery and work room combined, bath and a clip and kitchen combination.

This indicates a saving of 434 square feet in addition to the saving already made in the kennel arrangement. Since all units in Hospital B are much more interlaced, there would be less unproductive space in corridors, hallways, etc. The number of outside runs and their size could also be reduced, thus the two hospitals would be of equal capacity but of greatly different cost.

Economic equipment arrangement gives economic room size, the best arrangement

sizes brought together will result in the most economic hospital layout. Several possible solutions should be studied in the rough and, once selected, it should be adhered to and further developed to the final working plans. Let us assume that no definite building site has been selected and that a choice of several locations is available. The only mandatory condition is that the number of kennels must be 50, of the sizes mentioned. With these kennels as a nucleus we prepare then a list of all other requirements.

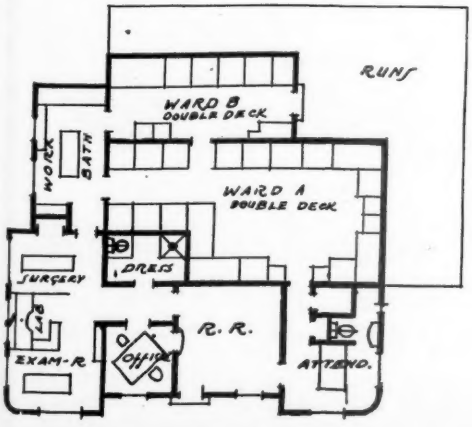
The Components of the Productive and Non-Productive Portions of a Hospital

Hospital A

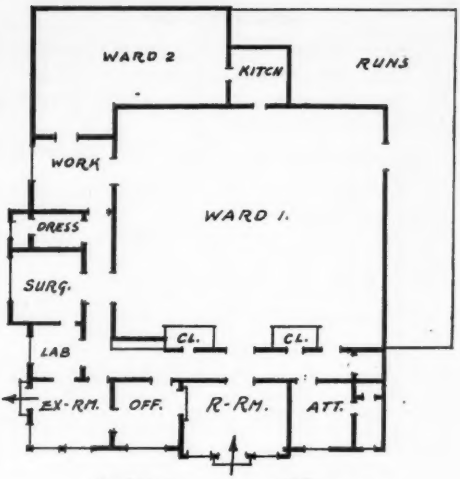
Non-Productive	Productive
Reception room	*Examination room*
Office	*Surgery*
Dressing room	*Pharmacy*
Work room	*Clip and bath*
Laboratory	*General ward*
Kitchen	*Surgical ward*
Morgue	*Cat ward*
Garage	*Isolation ward*
Reception ward	*Boarding kennels*
Runs	*X-ray*
Toilet and bath facilities	*Maternity ward*
Attendants' room	
Closets	

Hospital B

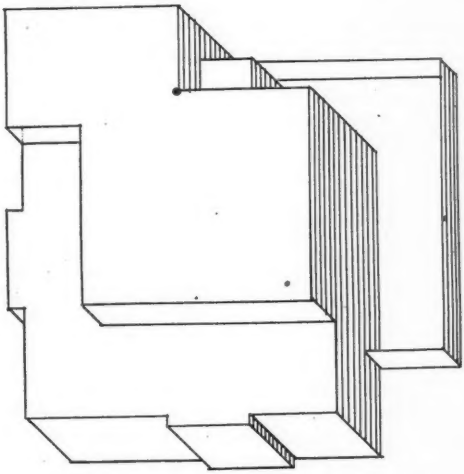
Reception room and office	*Examination, Pharmacy and Work room*
Runs	*Laboratory and X-ray*
Garage	*Kitchen, Clip and bath*
Toilet and bath facilities	*Reception, General and Maternity wards*
Attendants' room	*Cat ward and Boarder kennels*
Closets	*Isolation ward* and Morgue



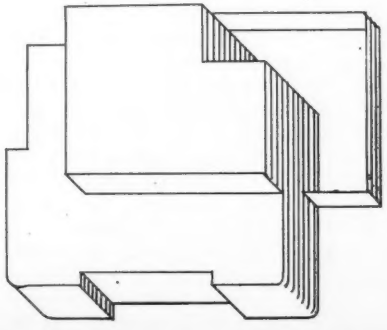
HOSPITAL "B" -1434 Sq. Ft.



HOSPITAL "A" - 2585 Sq. Ft.



Architectural outline sketch of Hospital A



Architectural outline sketch of Hospital B

Equipment List

This list is followed up by an equipment list. The fixed equipment is in italics to call attention to the necessity for making structural provision in planning.

Fixed Equipment	Movable Equipment
Vestibule	
Night Bell	Bulletin Board
Reception Room	
Telephone	Chairs of various types
Light	Costumer
Floor plugs and convenience outlets	Umbrella stand
Heating unit	Magazine rack
	Small desk
	Mirror
	Pictures
	Floor-lamps
Examination Room	
Sink	Examining Table
Small drug supply and sundry lockers	Irrigation stand
Special spotlights	Disposal can
Overhead light	Instrument cabinet, if built in, fixed equipment
Head light sockets	Checking system
Wall plugs	Restraint material
Concealed seat	Record arrangement
Communication with office	Movable collecting kennels
Signal Bell	
Hose attachment	
Floor drain	
Heating unit	
Office	
Safe	Desk and chair
Book case	Filing equipment
Convenience outlets	Typewriter desk and typewriter
Light	Costumer
Heating unit	Waste basket
	Cash register
	Bulletin board
	Dictaphone
	Client's chair
	Easy chair
	Magazine rack

A complete listing of equipment would be unduly long but it should be made out for each room in the hospital as for the examination room and office.

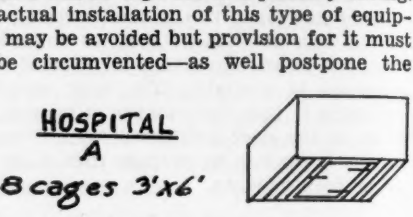
Hospital B would for two reasons call for a simplified list.

Reason 1: Reduced space available will not permit the placing of all equipment. This will especially affect the movable equipment.

Reason 2: Funds for the purchase of a large part of this equipment are not available.

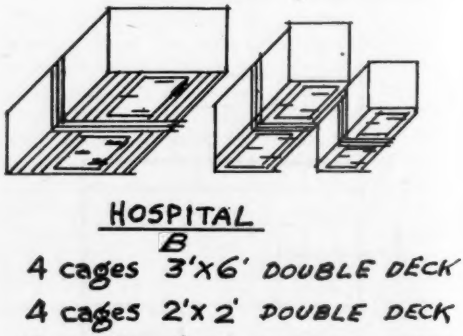
In the planning of the exterior our wishes should be vaguely kept in mind from the very beginning. This wish might have to be modified or altogether forgotten, for the reason that certain plans are not applicable to certain exteriors. The exterior or "elevation" should always be a logical development of the plan.

Referring again to equipment: It is soon realized that provision for the installation of permanent equipment cannot be modified in any manner. If this is tried, the cost in future alterations and building extras during construction will be high for this primary saving. The actual installation of this type of equipment may be avoided but provision for it must not be circumvented—as well postpone the



wiring for electric light, convenience outlets or piping for heating units. However, the actual purchase of a light-fixture or a radiator may be postponed. Space provision is made for 50 kennels, but it is found convenient now to purchase but 25. Provision is also made for a nice office with a fine desk and elegant carpet —why not do the office work at home until such time as funds become available for the purchase of these articles. Every hospital that boasts a surgery, will be the possessor of an operating table, a sink or lavatory, a sterilizer and a light-fixture of some sort.

But it is likely that many hospitals will have equal additional equipment. Methods of procedure vary, methods of restraint are different, methods of after-care are individual,



etc. As small animal practice progresses these things will become more standardized. Until then all must take advantage of personal experiences and absorb such information as appears to us to be worthwhile and applicable.

For example, the perfect kennel or perfect kennel arrangement is still a very hazy ideal, and the designs here presented are mostly for constructive suggestions and criticisms. Owners of hospitals that have used this type of kennel are very enthusiastic over them.

All kennels must fulfill certain purposes, the most important of which are: (1) Security of animal, (2) comfort to animal, (3) practicability of handling, (4) convenience for the doctor or attendant, (5) practical sanitation, (6) ease of cleaning, (7) durability, (8) appearance, (9) natural illumination and (10) economy of cost.

The animal must be kept secure to satisfy the owner, afford the hospital control over the patient, and prevent prowling and injury to other patients. The kennel must be large enough for the animal to lie or stand fully extended in any position. The dimensions should not exceed these requirements by more than a very small margin. The door of the kennel should be large, so that the animal may be easily grasped and taken out of the

This illustrates well the fullest use of all available daylight at the same time excluding public gaze. The illumination is good day or night. Glass block are excellent both for inside partitions and outside walls

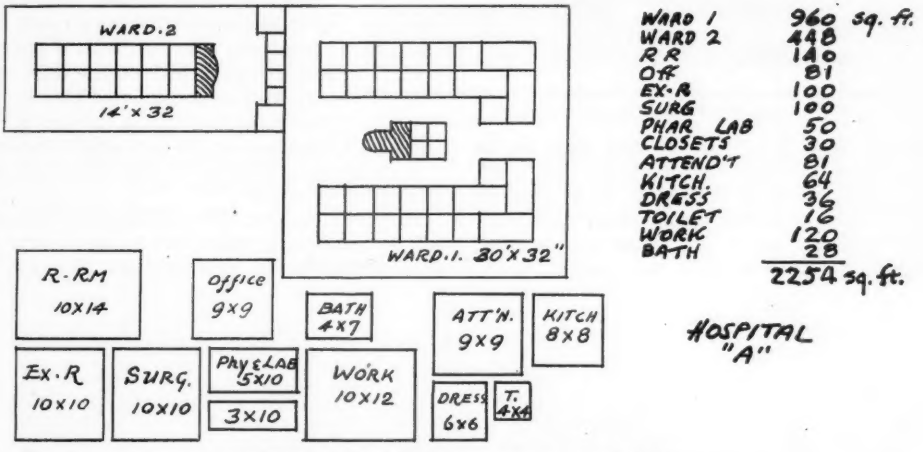


Illustration of utilization of area in Hospital A

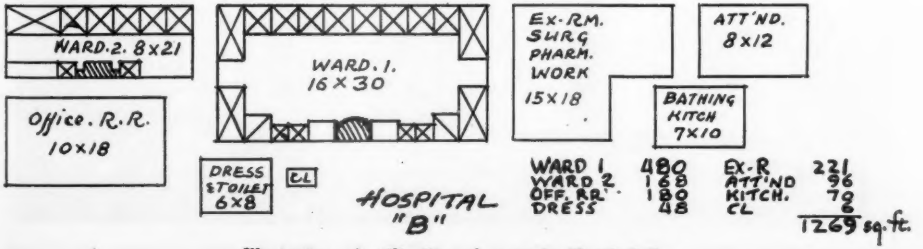
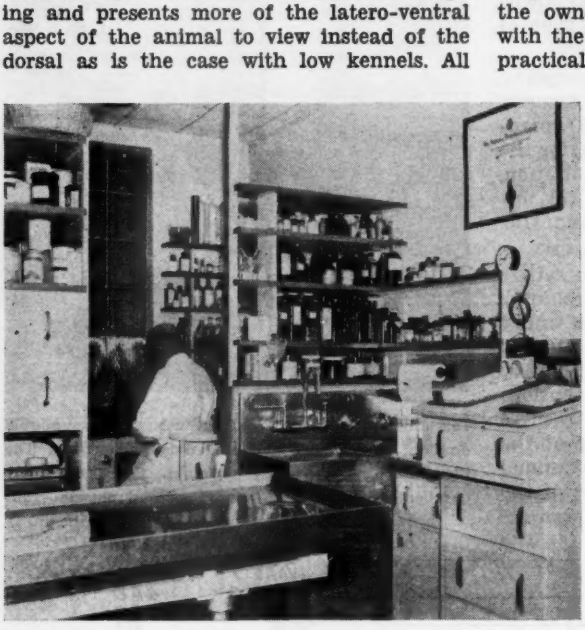


Illustration of utilization of area in Hospital B

kennel or placed therein. A floor height of 36 inches is the favorite of all who have tried it for it brings the patient to eye level for observation, or kennel treatment, saves stooping and presents more of the latero-ventral aspect of the animal to view instead of the dorsal as is the case with low kennels. All



Compactness of floor planning saves thousands of unnecessary steps and keeps building costs down

interior surfaces of the kennel must be as smooth as possible, free of cracks and crevices, shed liquid of any kind freely and be easily cleaned. Bothersome ledges and inaccessible places are to be avoided. A wooden floor should be removable for ease of cleaning and thorough disinfection. Smooth surfaces are most resistant to wear and tear, and places that present a hold for the teeth should be protected. A kennel must look pleasing to the owner of the animal and impress him with the ultimate in animal contentment. No practical access of outside light should be obstructed with anything more than iron grills. The cost must not be prohibitive, but it must not be assumed that a satisfactory kennel can be constructed cheaply.

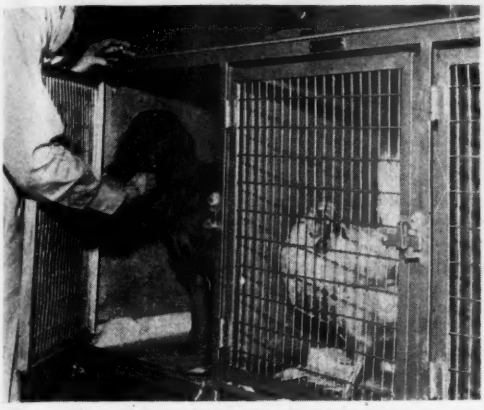
Kennels may be constructed of wood, wood and metal or metal exclusively. Tile, glazed brick or hard cement are used in the construction of built-in kennels and are applied over understructures of brick, hollow tile or wire-lath. Kennels should be of uniform size in their respective classes, to facilitate interchange of parts. Provision must be made for a removable watercup. In cat-cages a small ledge or shelf is desirable to give these animals opportunity to get off the floor. Rabies kennels should be indestructible and capable of confining a small cat securely. Boarding kennels are of a more open type and may well be constructed entirely of wire-mesh partitions, thus presenting an appearance of freedom and spaciousness. Maternity kennels should have attachments for curtains.

The drug station: Few things in a hospital will save as many steps and as much time as a properly located drug station. This should

The attractive building shown above was designed and built by the author a number of years ago. It had just been completed when the photograph was taken. Tasteful landscaping later added much to its beauty

have a wash bowl of some sort with hot and cold water, provision for hose attachment, a few shelves for liquid drugs and tablets and a cabinet containing a few sundries and clean towels. Spread of infection to the general drug source is in this manner greatly curtailed.

Clipping and bathing facilities should be well arranged and properly cared for. An old style bath-tub will, if properly placed, be serviceable, but has the appearance of an improvisation. A wash bench will often be better appreciated by the dog. The attendant should don a rubber apron and boots and go to it with a brush, soap and hose. A well drained floor under him will do the trick to a "T."



Kennels are a productive facility and should not be "stinted" as to space, location or construction. Kennels of wood, tile, glass, metal and plaster on wire lath all possess certain advantages

In these days of prepared dog foods a kitchen often is a myth. However, whatever the feeding arrangements, provision must be made for the proper washing and sterilization of all feeding dishes, utensils and water-cups.

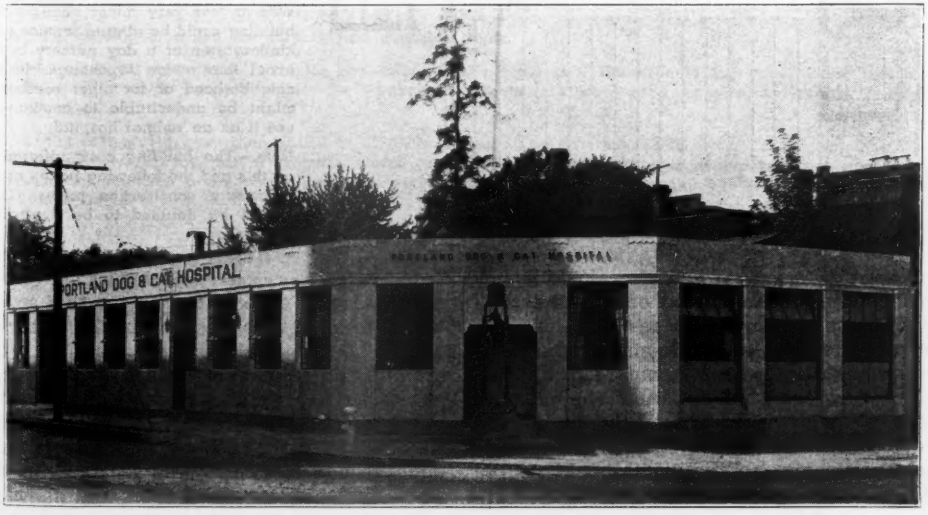
No material is more suitable for hospital flooring than concrete or tile. In the reception room and office, linoleum may play the role of substitute. Rugs and carpets are objectionable.

Proper drainage of all floors which will be hosed must be provided. Floor traps placed in logical places greatly facilitate the maintenance of sanitation by the elimination of drudgery.

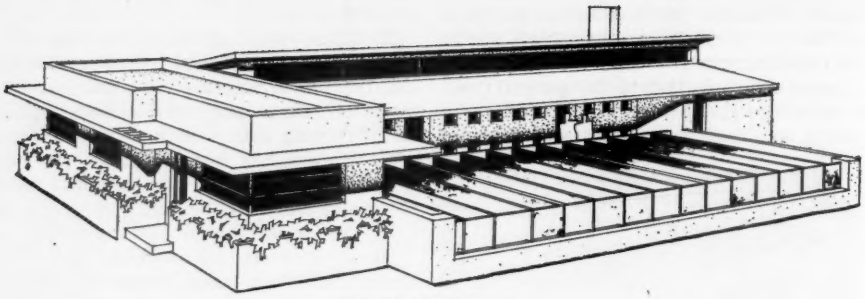
To recapitulate: Let the hospital be a building planned, constructed and equipped to house the patients efficiently; to make the necessary care bestowed upon them a pleasure and a profit to the veterinarian. Have it be a distinct contribution to the community and fulfill to the letter all the purposes of its name—"Hospital for Small Animals."

Criticism of Designs for a Small Animal Hospital

To further illustrate the principles discussed in the foregoing article, Doctor Schreck was asked to comment on the small-animal hospital plans published in the February, 1941, issue of VETERINARY MEDICINE. These plans are reproduced in the following pages with Doctor Schreck's comments appended to each.



A feature of this hospital, designed by the author 25 years ago, is the statue of a dog (center) erected at a prominent street intersection and having a driveway between it and the building

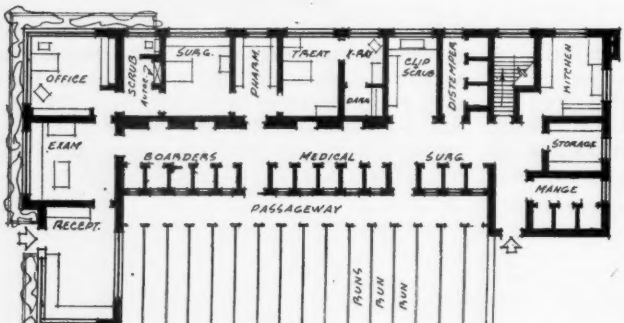


Design by John Cooper

This design is one answer to the needs of the veterinarian for a structure to enclose both office and clinic. It is not elaborate, in fact, simplicity has been the keynote. It has, however, been designed for a maximum of efficiency.

Planned for a small lot in the Southern section of the country, the hospital is compact without sacrifice of adequate circulation. Attention was given to the separation of its various functions such as reception, treatment, animal boarding, and service. The cost of the unit should not exceed $10,000 and might best be placed on a relatively level lot about 125 by 200 feet.

Fire-resistant monolithic concrete construction is suggested throughout. Much of the exterior wall surface is devoted to window area. The extensive use of glass is equally as practicable in the North as in the South. A feature of lighting is the long clerestory window treatment in the corridor between clinic and kennels. The kennels are lighted by heat resistant glass on the outside walls. Kennel blocks for boarding animals are segregated from the kennel blocks for dogs under treatment. Room is allowed at the rear of the court for ambulance parking.



FLOOR PLAN

The court for animal runs has a southern exposure, thus gaining a maximum of sunlight—and by this orientation the long clerestory receives most satisfactory lighting. The clinic has a north exposure and so receives no direct sunlight, consequently no shadows to interfere with daylight operations and laboratory work. Special features include all built-in cabinet units, autoclave, etc., in the corridor. The office has built-in features for storage, etc.

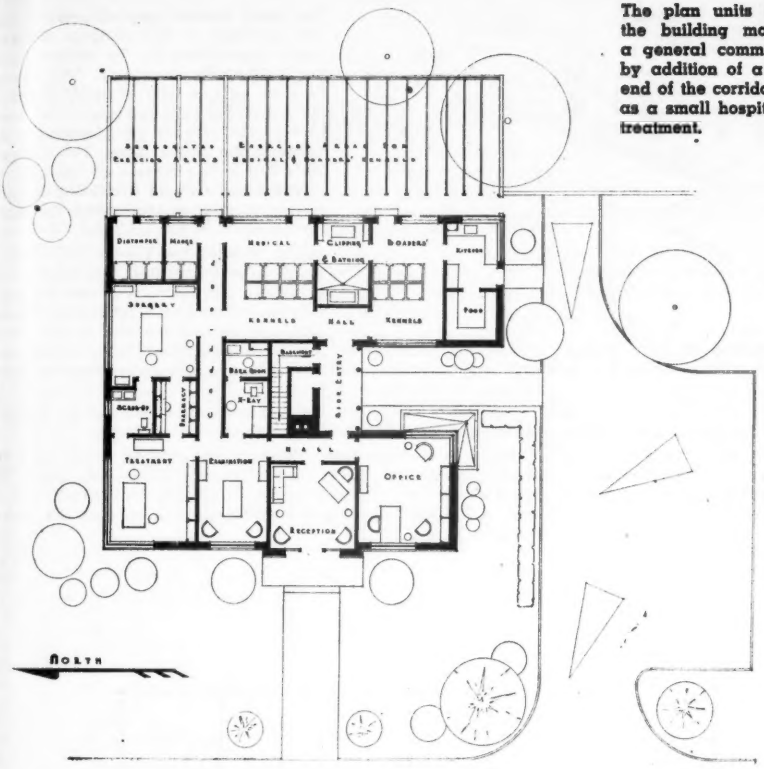
With a few very minor changes the building could be altered for use as a kindergarten or a day nursery in the event that owing to changes in the neighborhood or for other reasons it might be undesirable to continue to use it as an animal hospital.

Note.—The building costs referred to on this and the following pages apply to prewar construction prices. They should be doubled to be applicable at present.

Comment on Plan above: This plan would be improved by interchanging the office and examination room; placing the X-ray and pharmacy between the examination room and the surgery; eliminating the treatment room and incorporating this function and the clipping room in the kennel arrangement. The kennels are too few in number. They constitute income producing facilities and should not be stinted in the space allotted.

Comment on Plan on next page: A very active veterinarian who expects to pay for this set-up will have little time to spend in the elaborate office. The plan would be more practical if the examination room were replaced with a *small* office, the treatment room were incorporated in the kennel ward and the examination room were placed in the corner. The scrub-up room and the pharmacy are well located. On the whole there are too many doors and hallways.

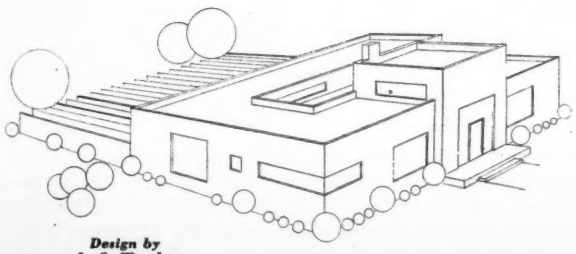
The plan units are so arranged that the building may be converted into a general community clinic easily or, by addition of a bedroom wing at the end of the corridor, it might be adapted as a small hospital for specific disease treatment.



Two of the factors controlling the design of this building were circulation and orientation. An effort was made to arrange the rooms and corridors in such a manner as to provide logical handling of the animals as they are brought into the building, carried through their treatment period, and returned to their owners. In doing this the necessary handling of the animals while under treatment for long or short periods was kept in mind. A rear entrance is provided which is handy to both kennels and to treatment areas. The scrub-up and pharmacy are located conveniently between the surgery and treatment room.

The building should face to the west for best orientation in each unit. The kennels then receive east and west light. North light would be provided for the surgery and treatment rooms—as in the case of hospitals for human patients.

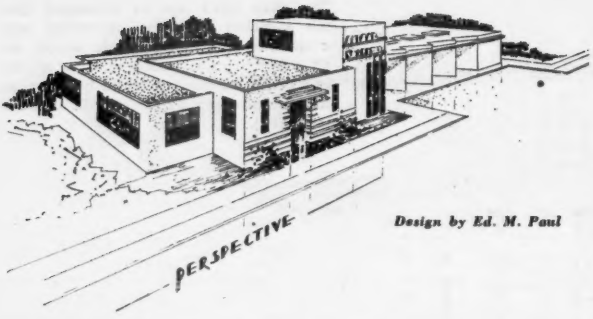
Construction cost would vary from $8,000 to $12,000, depending on different materials and equipment. The building is designed for construction in concrete, stucco on tile or brick or similar masonry material. It would have steel windows, linoleum floors, steam heat, fluorescent lighting, etc. It would require a level plot of ground which should have frontage of at least 150 feet.



Design by L. C. Worthy

PERSPECTIVE OF MASS

Some of the advantages of this plan are in its compactness, easy accessibility from one interior area to another, and in the economical use of corridor arrangement. The separate units of the building are well related to one another from the standpoint of their particular uses.



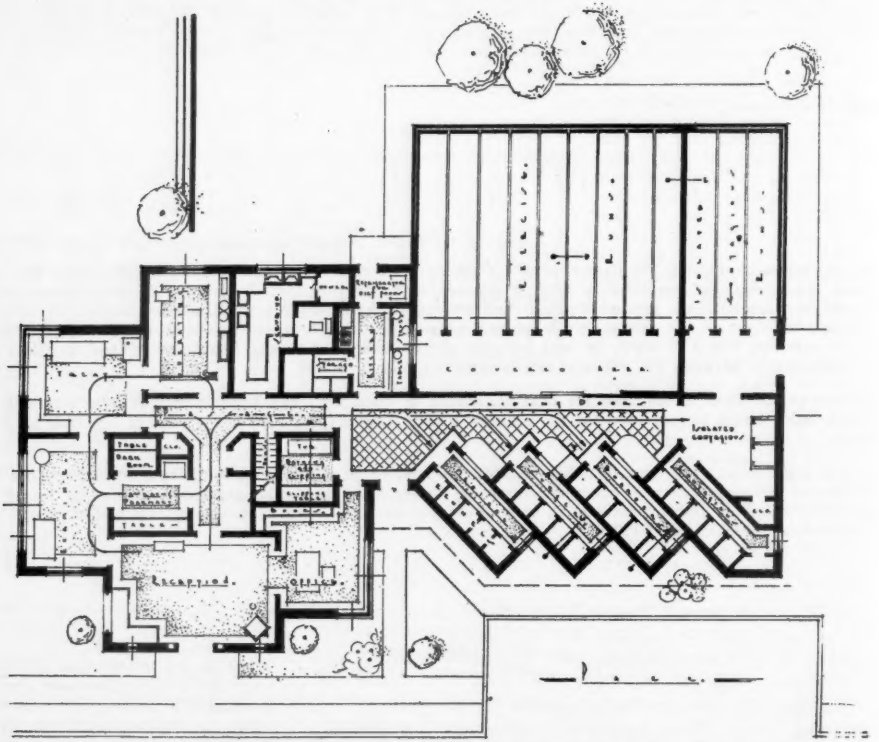
Design by Ed. M. Paul

The small animal hospital presents special problems to the designer not generally appreciated by the layman—until the building is completed. The special functions of this type of building and of the individual units comprising its whole become the primary consideration in developing the sketch plan. The designer feels that in this scheme he has attained a distinctive unity of functional architecture in a solution that meets the major requirements of the problem.

In this design the kennel unit will be worth close study as it was designed in a manner that seems to permit maximum efficiency. The kennel entrances are adjacent to one another and to a separate work table at each entrance for each kennel. This solution presents a satisfactory plan for utilization of light and ventilation. The kennel feature becomes a dominant feature of plan and elevation and reflects the function of the building as a whole.

The office is adjacent to the spacious reception room and is also easily accessible to other rooms of the hospital. Its distinctive window treatment, both interior and exterior, is a feature.

The hospital is designed for construction in hollow tile with a stucco finish. It should be on a lot about 150 x 200 feet. The enclosed runs, when landscaped, would not be objectionable in any residential section. Because of the special handling of kennel areas the building would not readily adapt itself to remodeling for another type of work. The hospital should cost in the neighborhood of $12,000 but this cost would depend much upon the type of interior finish and the section of the country in which it was built.



Comment: The arrangement of the wards is very novel and might approach excellence if better advantage were taken of light and air by placing the windows high above the kennels. The examination, treatment and surgery rooms are too far from the patients. The bathing and clipping room is altogether to prominent. The whole thing is too much of a merry-go-round. I think the designer will be capable of producing an outstanding plan once he understands clearly the problems involved.

Design by Douglas Baker

This hospital was designed to meet the needs of the veterinarian whose practice includes a fairly large number of small domestic animals. There are sufficient kennels for animals to be boarded as well as provision for those hospitalized both for surgery and for contagious diseases.

The surgery room is provided with ample storage for instruments and accessories. It is conveniently located near the scrub-up area and the pharmacy room—which both become a part of the treatment unit.

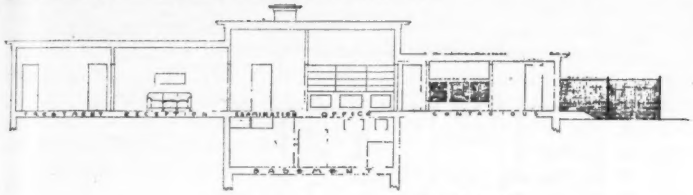
In the basement, beneath the central part of the building, are the heating system and the incinerator as well as storage area and room for the janitor or kennel man.

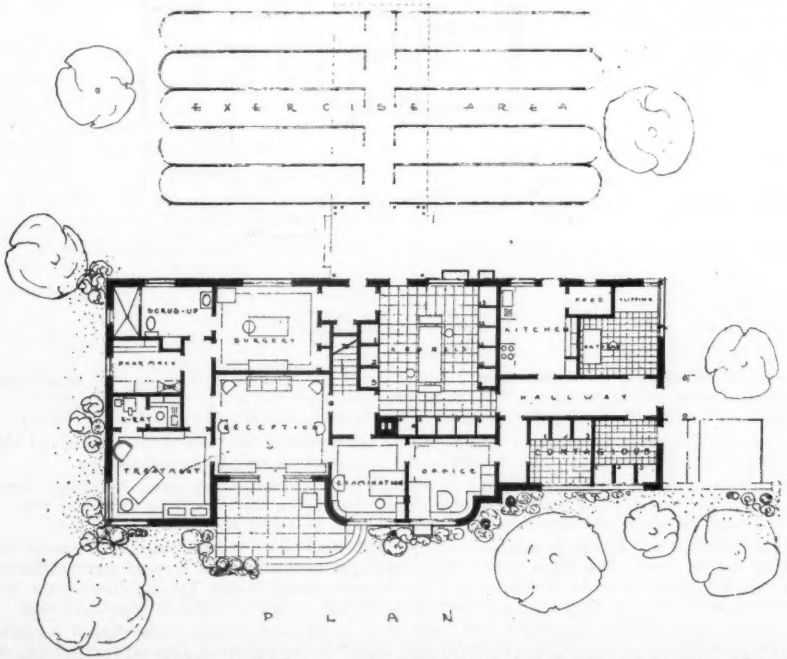
It was assumed that dogs suffering from distemper would not be able to use outdoor exercise area and so none was provided for them. No animal with a contagious disease need ever go near the boarders, or those undergoing surgical treatment or medical observation.

A kitchen is arranged for convenient access to both contagious and non-contagious wards. It has an adjoining storage room suitable for storing a half ton of dry food.

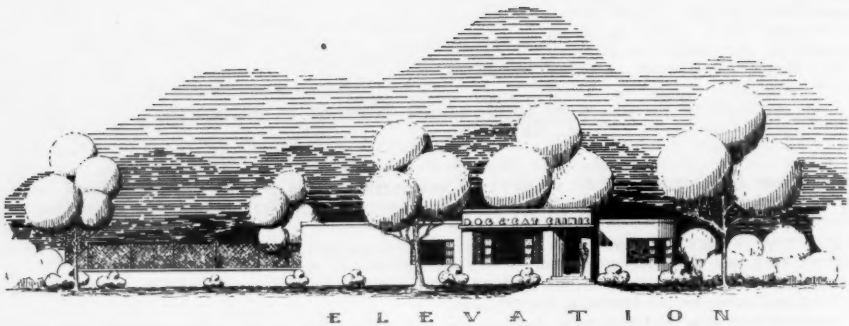
It is intended that the building be of monolithic concrete, steel windows, built-up roof and would cost approximately $9,000.00, depending somewhat on the section of the country in which built. It would require a lot of 125 feet frontage and one that was comparatively level.

No great amount of remodelling would be required to transform the building into a tea room in the event it should ever be desirable to discontinue its use as a hospital.

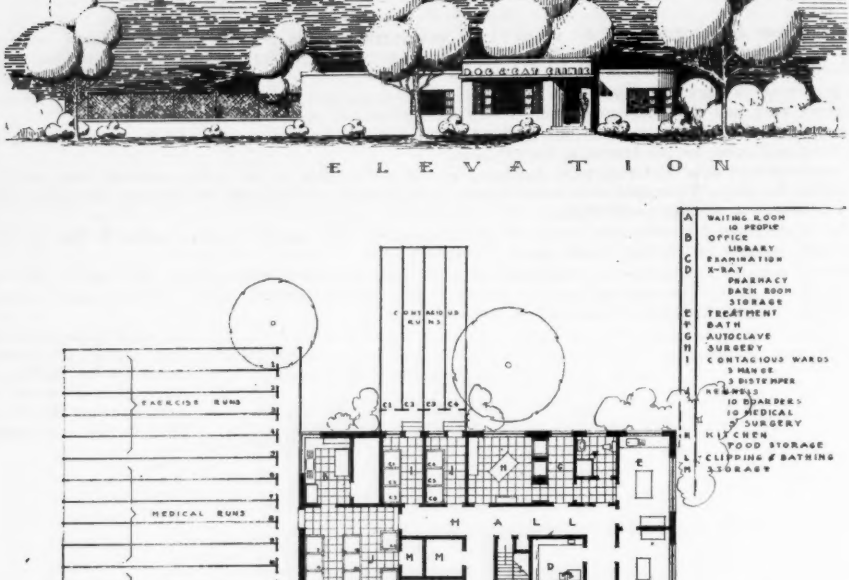




Comment: The exterior of the building is verypleasing as is also the large kennel room. However, the scrub-up, pharmacy, X-ray and treatment rooms take up space that should be occupied by the office and examination rooms. Another disadvantage: contagious cases must pass through the other ward or the office to reach their destination. The plan as a whole shows lack of study to fit the interior to the functions of the various elements.



ELEVATION



PLAN

Design by Ralph O. Kiper

This building was designed to give each room a maximum of natural light and air as well as a logical place in the relationship of each unit to the whole. The X-ray unit and stair are in the center of the building since they need no natural light and with this location affords a more compact plan which would fit on a slightly narrower lot.

The service area in the basement contains ample storage space and all features of the mechanical elements necessary. Employees' service rooms are also located in the basement as well as incinerator, etc.

The runs are so designed as to give separation to animals with contagious diseases. Individual kennels are of concrete. In the large kennel block the cells are two units high but in the contagious ward they are of single unit height. Each kennel has its own drain and is so designed as to be easily kept clean.

The hospital is designed to be built of brick veneer, painted white with cement paint. The interior walls are of plaster with an enamel finish. The floors are of tile, concrete or linoleum. This type of construction is relatively inexpensive and the total cost of the entire hospital should not exceed $8,000. The building would fit on a level piece of property about 100 feet frontage (including the runs) with a depth normal for suburban plots.

Because of the proposed location, an attempt has been made to give the exterior somewhat of a residential character so as not to be too much out of place in residential suburban development. This same character could be further carried out in the landscape treatment around the building. In the event that it might become necessary to use the building for another purpose, it could easily be turned into a physician's office or a day nursery school.

Comment: Better unity of the examination-pharmacy, surgery and X-ray rooms should be achieved.

Clinical Reports

Splenomegaly in a Coonhound

April 17 a Coonhound, male, seven years of age, was brought in for examination. The history given by the owner was vague—the hound had been ill about four weeks, or maybe longer, and had refused all food and drink for the past two days. There had been attacks of sporadic vomiting and of bloody diarrhea with fainting on attempted defecation.

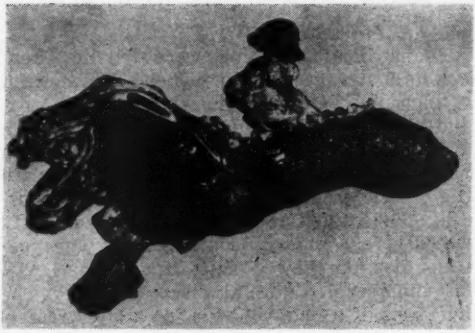
The dog was admitted to the hospital for observation, diagnosis, which was held in abeyance, and treatment. The temperature was 103°F. and the dog was emaciated, anemic and showed marked tenderness in the abdomen on palpation, making examination difficult. Repeated fecal examinations were negative.

The prognosis was recorded as unfavorable. A mild enema was given but the only return was a mixture of blood with water. An X-ray picture of the abdominal area was taken which revealed excessive quantities of gas which led us to suspect a foreign body or tumor. The patient was given 5cc of thrombozyme subcutaneously, and half an ounce of cremosuxadine per os.

April 18: The temperature was 102°F. and the dog was in the same general condition as on the preceding day. He was given two ounces of cremosuxadine and two ounces of a kaolin-bismuth-pectin mixture. This he vomited promptly. The bloody diarrhea continued—some seven or eight bowel movements per day. The patient was given 5cc thrombozyme and 50cc each intravenously of normal saline and 10% calcium gluconate. With the owner's consent we decided to do an exploratory laparotomy the next day, in the meantime, trying to restore the body fluids with saline, dextrose and amino acids intravenously, throughout the day. It was at this time that the owner disclosed that the dog had only recently been treated by two other veterinarians.

April 1: The temperature was 102° F. An exploratory laparotomy was performed in the morning. The spleen was enlarged to about eight times its normal size and weighed about four pounds, on a crude scale. On its lateral surface was a large abscess and also an ulcer about two inches in diameter and about one-half inch deep. The organ was engorged with very dark blood, and there were many omental adhesions. The spleen was removed surgically and the laparotomy incision was closed. A further course of saline, dextrose and amino acid intravenous therapy was given, but by evening the animal's condition was very low.

April 20: Temperature 98° F. The hound was moribund and died at noon. The owner refused pathological and bacteriological examinations.



Comment: While veterinarians in small animal practice often encounter cases with anamneses and symptoms very similar to this particular case, it is not often that we encounter splenomegaly, especially with abscess and ulcer formation. It is unfortunate that it was not possible to section the spleen for microscopic examination and to do the bacteriological examination necessary in order to determine the etiology of this unusual disease process.

By JOSEPH ZELDNER, D.V.M.
and GILBERT MEYER, D.V.M.
Detroit, Michigan

Unusual Abscess in a Dog

A male, mongrel terrier, six months of age, was presented for treatment for a bone lodged in the throat.

The history of the case was typical of an esophageal obstruction. The owner had seen the dog swallow the bone and ever since, the puppy had been making strong attempts at deglutition. He also showed signs of hunger, but would regurgitate immediately after eating.

With these classical textbook symptoms confronting us we were absolutely sure that there was a bone lodged in the esophagus. Upon fluoroscopy all we could detect was a suspicious shadow above the heart. We were convinced that it was a bone of very porous texture.

The animal was given one-half grain of morphine sulfate, which quieted him sufficiently for the passage of a stomach tube. Much to our surprise the tube passed into the stomach with little difficulty. The "suspected shadow" was still there, but directly below the stomach tube.

At this stage of the operation we had no diagnosis to offer and decided to wait develop-

ments until the following day. By that time the patient's temperature was 104°F; he had a severe bronchial cough and refused food.

For economic reasons the owner requested euthanasia and permission was obtained for an autopsy.

The pathlogical findings were striking. There was no bone, (even if the owner had seen him swallow it). Over the heart and between it and the esophagus and trachea there was an area of caseous necrosis of the diameter of a half-dollar. The necrotic material involved the chiefly esophagus, causing a partial stenosis. The right lung, in its anterior one-half, was severely engorged with blood. The posterior portion showed signs of atelectasis. The left lung seemed normal, macroscopically. The liver was of a pale yellow color and extremely friable. The intestinal tract was heavily infested with ascarids.

As for etiology, there were too many contributing factors to blame any one in particular. Between the ascarids and a city that is filthy with distemper ample reason existed for the lesions found on necropsy.

The mistaken diagnosis it is believed to be worth noting. It is not unusual to obtain an incorrect anamnesis from the owner, but it must be rare for it to fit exactly the symptoms of an ailment entirely different from the one affecting the animal.

Danville, Virginia — By PAUL FRIEDMAN

The Toxicity of Gammexane for Cats

A long-haired Persian cat, in poor bodily condition and with extensive Notoedres and Otodectes mange lesions all over the body, was bathed in a 1:1,000 suspension of a dispersible gammexane powder (containing 50% of benzene hexachloride and 6.5% of the gamma isomer, i.e. 0.0065% gamma isomer in bath), after preliminary bathing in warm, soapy water and removal of gross scabs with forceps. The cat was dried with a towel between the baths and after the second bath, then put in the sun to dry. It was not observed to lick itself, but was still slightly damp when symptoms of toxicity appeared four hours later. Gross muscular shivering was noticed progressing to mild clonic convulsions with obvious distress and plaintive mewing between convulsions. Ten milliliters of 5% calcium gluconate were given subcutaneously, but no response was observed in the next 20 minutes. The convulsions increased in intensity and frequency with opisthotonous, paddling movements with all four legs, lateral recumbency, gross muscle tremor and pronounced pupillary dilation. Salivation and champing of the jaws were marked. Nembutal was administered intraperitoneally. Fifteen minutes later respiration became labored and ceased. No response occurred to artificial respiration or the intramuscular injection of 2 ml of coramine.

To determine whether the effect of this bathing was due to idiosyncrasy in this particular cat, a common, short-haired cat in moderate bodily condition was bathed in an identical suspension, but without ill-effect. A week later the same cat was bathed again, but this time a bath in warm, soapy water was given first. Symptoms of toxicity appeared 5.5 hours later. The cat became restless and walked about the cage, shaking its paws as though they were painful.

One-half hour later, a sudden attack of frenzy occurred, the cat clawing and biting at the cage in a frenzied manner with erection of the hair along the back and on the tail. Pronounced salivation was present, and the cat bled from the mouth. No pupillary dilation or muscle tremor occurred. This paroxysm lasted for two or three minutes, after which the cat was hyper-excitable for another five minutes, showing excessive responses to sound and movements.

This period was followed by one of mild somnolence, in which the animal appeared to be asleep. An hour later it was apparently normal and no further symptoms were observed in the subsequent 24 hours. The cat was observed to lick itself several times before symptoms appeared.

It is possible that the bathing in warm, soapy water before dipping in the gammexane bath may have been important in the production of toxicity, by removing the natural skin fat and allowing more thorough wetting of the skin. The milder symptoms observed in the common cat may have been due to its much thicker hair coat which made the animal difficult to wet thoroughly, and to the absence of skin lesions which may have facilitated absorption of the gammexane in the Persian. —D. C. Blood, C. P. Craven and K. J. Astill, Faculty of Veterinary Science, Sydney University in the *Australian Vet. J.* 24:5 x (May) 1948.

Iodine deficiency results in lowered reproduction, lowered vitality at birth and consequent mortality in young animals from various diseases and unfavorable conditions and minor hormone and nervous disturbances. Goiter, hairlessness, deformed young and young dead at birth indicate advanced stages of iodine deficiency. These severe cases are more spectacular, but economically, less important than the common, much milder cases.

Dysuria in Dogs and Cats

By C. H. BECKMAN, D.V.M.
St. Louis, Missouri.

DYSURIA is painful or difficult urination. It may be due to various causes, but in dogs it is usually due to paralysis of the bladder or to blocking of the urethra by one or more calculi.

These conditions may be encountered in dogs of any age, but are more commonly seen in older animals or during and subsequent to various debilitating febrile illnesses or severe injuries. In the majority of cases, the cessation or urination goes unnoticed until the animal is systemically affected and other damage has occurred. The commonest history is that the animal has become listless, except for the constant effort to urinate or straining as if trying to pass something. Many times the owner will report that the animal is attempting to defecate, but without success. The temperature may or may not be affected, depending on the duration of the condition and complication that may be present. If the dysuria is of long standing the temperature is likely to be subnormal and the animal toxic, as will be shown by the cardiac action and pulse. Many of these cases appear without apparent cause. In senility there sometimes exists a definite dysfunction of hormonal secretion, or at least an impairment of hormone function. This is accompanied by various syndromes, usually involving the urinary system.

In treatment of apparent senility of aged dogs I observed that this urinary involvement was relieved by the use of the opposing sexual hormone therapy; i.e., by ovarian extract in the male and testicular extract in females. In cases involving urinary stoppage in younger animals, a trial of opposing sexual hormone therapy resulted in a pleasant surprise. This urinary stoppage is frequent in tomcats of any age, but is most common in middle life or in older males.

This report involves six male cats, one spayed female toy terrier and one castrated male cat.

The case of the six male cats may be described in a single report, as conditions were apparently the same, with only minor variations and the treatment and end results were the same.

Cases 1 *to* 6.—These were male cats all of middle age or older. Case 1 will be described. A four-year-old male, alley variety, was presented with a history of becoming listless, losing its appetite and staying in the sand box and straining strenuously but passing nothing. Thinking the animal was constipated the owner had given it mineral oil and milk of magnesia, without affecting any relief. Then an enema was given with slight staining of the water expelled.

When the cat was brought to the hospital his hair coat was ruffled, harsh and unkempt. He was listless and made attempts to pass something while on the examining table. The temperature was 102°F. (The temperatures of the other five cats varied from sub-normal to 104°F, according to the duration of the urine stoppage.) The respiratory sounds were listened to *via* stethscope as were also heart sounds and pulse, without discovering material abnormality. The eyes, ears and mucous membranes were examined and finally the abdominal cavity was palpated and a greatly distended bladder disclosed. On slight pressure only scanty droplets were voided. Never having had much success in catheterizing male cats, no attempt was made to catheterize this one.

The cat weighed 10 pounds and 10cc of ovarian substance* was given subcutaneously over the thoracic region and massaged well for rapid absorption and quick action. This dosage is based on one cubic centimeter for each pound body weight. Without outside pressure, urine began to flow within 30 minutes and soon the bladder was emptied. Diuretic and other supportive treatment was given and the animal was returned in four days for another injection. This time the dosage was reduced, giving 7.5cc, or 0.75cc per pound of body weight being given. A week later the animal was returned for further injections, which were reduced to 0.5cc per pound, body weight. This dosage was repeated twice (three times in some of the cases). All these cats have been healthy and free from recurrences of dysuria for six months to a year.

I have not used any other form of estrogens in these cases. Some one may have had similar experience with other estrogens and should report it, I can see no logical reason why some of the oil soluble material should not give as satisfactory results. The water soluble whole ovarian substance was used in a man who suffered excruciating pain, that persisted for several days after a cystoscopic examination. Each urination was dreaded until the water soluble whole ovarian substance was given, 15cc intramuscularly (5cc in each of three sites). Relief occured within one hour.

Case 7.—Castrated male cat, six years of

*A commercial product consisting of a water soluble extract of whole fresh ovaries, each cc being the extract of four grains of fresh ovarian tissue.

age: This animal was presented for examination with a temperature of 105°F., labored breathing, nasal discharge, loss of appetite, listless, heart rapid, toxic, only tubular breathing except for small areas in both lungs. The diagnosis was double pneumonia. With symptomatic treatment the animal was on the road to recovery in 10 days with a favorable outlook and all seemed well. There was no urination on the 12th day. The case looked like a relapse. The temperature was normal, but on examination the bladder was discovered to fill the entire abdomen. Slight pressure brought no urine. The cat weighed 6.5 pounds, so 6cc of commercial orchic substance* was given. In a short time a flood of urine passed and on examination the bladder was completely empty. A few minutes more and the animal got up and looked around, then climbed onto the shoulder of the owner.

Case 8.—Five-year-old, spayed, toy terrier bitch. This case suffered a blockage due to calculus. It had a history similar to that of the cats, but the condition was not so advanced. The customary examination was made with the finding of great distension of the bladder and no urinary relief. Passage of a rubber catheter was attempted without success. Then a small metal catheter was substituted which struck a firm stone-like substance. She weighed 11 pounds so 11cc of water soluble, whole ovarian substance was given subcutaneously in the neck region. Within 30 minutes she strained and with great force discharged many stones well behind her. No attempt was made to determine the number of stones expelled. They varied in size and shape and had they been collected they would have made a sizable pile. Most of the urine was expelled on the table but the animal was taken for a walk and she passed more urine and more stones the while. This case was returned as were the cats. A few more stones were reported to have passed without distress over a short period. This animal is being closely watched, but has exhibited no further distress to this date.

This treatment in this spayed or castrated female constitutes opposing hormone therapy or substitution therapy as she is deprived of her ovaries. No observation has been made on the natural female.

This hormone therapy relaxes the urethra, gives tonus to the bladder and a feeling of well being to the animal. When there is blockage due to calculi the relaxation of the urethra permits the pressure of the accumulated urine to expel the stones unless the size of the calculus is too great. This same condition occurs in retention of the urine due to other causes.

*A water soluble extract of fresh testicular substance. One cc represents 155 grains of testis.

Book Reviews

Manual of Veterinary Bacteriology, by *Raymond A. Kelser,* D.V.M., A.M., Ph.D., Brigadier General, U.S.A., retired; Professor of Bacteriology and Dean of the Faculty, School of Veterinary Medicine, University of Pennsylvania and *Harry W. Schoening,* V.M.D., In Charge, Pathological Division, Bureau of Animal Industry, U.S. Department of Agriculture. Fifth edition; 767 pages; 101 illustrations. Published by Williams & Wilkins Co., Baltimore; 1948. Price $6.50.

The fifth edition of this excellent work appears just five years subsequent to the publication of the fourth edition, which had been exhausted and unavailable for nearly a year.

The changes in the text in this edition, which consist almost entirely of additions (48 pages) are important, although not conspicuous.

The plan of the work is the same as that of the previous editions which have received the approval of the veterinary profession over a period of more than 20 years. Following a discussion of bacteria, pathogenic fungi, protozoa, and filterable viruses are treated fully. The four concluding chapters are: Serology, Hematology, Preparation of Veterinary Biological Products and Bacteriological Examination of Milk and Water.

The classification of organisms and nomenclature are those of Bergey's Manual, but synonyms are given both in the text and in the index; a distinct advantage for those whose bacteriology is becoming grey at the temples.

A search for minor and in many instances unimportant omissions or other faults in the text is not unrewarded: Queensland fever is not described. There are two pages of description of rinderpest tissue vaccine but goat blood vaccine, the vaccine generally used against rinderpest, is not mentioned; and avianized rinderpest vaccine, presumably the choice of all rinderpest prophylactics, is disposed of in ten lines; Tetanus toxoid, which likely stands highest in efficacy among biological prophylactic agents, is given the anemic accolade of "well worthy of consideration in wartime". Given to soldiers this product reduced the attack rate of tetanus to one in two million and the death rate to nil; in horses both rates fell to nil. And these results are obtainable in peace as in war. The discussion of antibiotic agents is limited to less than three pages. The terms "anti-hog-cholera serum", "anti-hemorrhagic-septicemia serum", etc., through the long list is used instead of the more accurate designation, hog cholera antiserum, etc. The obnoxious habit of calling lesions "pathology", an affectation of many medical writers is not entirely avoided. The abbreviation "mgm", which has no standing with lexicographers, is used.